The Augmented Reality Book Model as an Educational Media in Improving Dental Health Maintenance Behavior for Parents and Dental Hygiene Status in Pre-School Age Children

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Abstract:- **Augmented reality is a relatively new technology. The concept of content in this research is to combine AR and children's illustration books. This content can later be scanned/scanned by the AR application and display the shape of a 3D model. The content presented is in the form of book illustrations and 3D models that can display parts of the oral cavity. This type of research is a mix method with an R&D research design. The population in this study were students of TK Pelangi and TK Al-Manar Cirebon City. The sample used was 40 children who were divided into two groups, namely Pelangi TK students as the intervention group as many as 20 children and AL-Manar Kindergarten students as a control group as many as 20 children who met the inclusion and exclusion criteria, as well as 4 teachers and parents who attended number of children. Data analysis was performed by univariate, bivariate and multivariate analysis. The results showed that the augmented reality book model as an educational medium was effective in increasing knowledge, attitudes and actions to maintain dental and oral health in pre-school age children and was effective in reducing plaque scores in children compared to the control group. Proven p-value of knowledge (0.001), attitude (0.002), action (0.001), plaque score (0.001). Augmented reality book model as an effective educational media in increasing knowledge, attitudes and actions to maintain oral health in mothers compared to the control group. Proven p-value of knowledge (0.001), attitude (0.002), action (0.001). Augmented reality book model as an effective educational media increases knowledge, attitudes and actions to maintain oral health in teachers compared to the control group.**

Keywords:- *Augmented Reality, Education, Dental Hygiene.*

I. INTRODUCTION

Almost the entire population in the world has dental and oral health problems, namely caries which has a negative impact on a person's quality of life. Dental and oral diseases can pose a general health burden to many people and can cause pain, discomfort, disability, and death2.

In Indonesia, dental and oral diseases, especially caries, are still common in both children and adults. Caries often occurs in pre-school age children. Children who experience dental and oral health problems will be at risk as adults3. Globally, it is estimated that as many as 2.3 billion people have caries in their permanent teeth, while 530 million children have caries in their primary teeth. Dental health problems in Indonesia are still an important problem in health development, so the attention of health workers is needed. Based on the Household Health Survey (SKRT) that the prevalence of caries in Indonesia is 90.05% and is said to be higher compared to other developing countries5 .

According to the 2018 Indonesian Basic Health Research (RISKESDAS) it states that the largest proportion of dental and oral health problems in Indonesia are cavities with a percentage of 45.3%. The prevalence of caries at the age of 3-4 years is 36.4%. The prevalence of caries in West Java province is 45.7%. West Java Province is a province with a high number of cavities sufferers, namely as much as 58% of the population of West Java province who still experience dental and oral health problems and 11.9% of people who receive care and treatment from health personnel. Meanwhile, in Cirebon City, the prevalence of caries is 34.45%6 .

One of the diseases that is often found in pre-school age children is rampant caries. Rampant caries is a term used to describe a condition in which most or all of the milk teeth are decayed (caries) which is developing rapidly. Caries in pre-school age children can interfere with the masticatory and digestive systems so that it can interfere with health in their growth and development. The causes of rampant caries are due to several things, such as: the act of drinking milk through a pacifier which is exacerbated by not brushing your teeth, the not optimal attitude of parents regarding how to care for your teeth accompanied by a lack of knowledge, and inadequate physical environmental factors 8 . According to the Centers for Disease Control9, pre-school age children (age 3-5), it is necessary to limit the consumption of instant food, cariogenic food, and foods that contain excess salt and MSG. The CDC also advises preschool-aged children to eat fruit and vegetable foods. This is to prevent disease in the child's body in the future. Dental and oral health care from the age of children is important, because at the age of children, teeth are very vulnerable to dental and oral health problems. If it is not prevented or treated, it will cause disease or cause bad teeth. There are several factors that can cause caries in children, namely enamel damage, frequency of consuming sugar, lack of fluoride, frequency of brushing teeth and behavior of maintaining oral and dental health that is less than optimal11. As many as 94.7% of Indonesian people brush their teeth, but only 2.8% of people brush their teeth properly12 .

To emphasize the number of dental and oral health problems, the Ministry of Health designed a caries-free Indonesia in 203013. To increase efforts to maintain dental and oral health, especially in pre-school-age children where at this age children are experiencing teeth growth. Bad habits of children are not easily corrected if the cleanliness of their teeth and mouth is still low. The cause of low dental and oral hygiene problems is due to lack of knowledge about dental health14. The formation of dental and oral health maintenance behavior should be done at an early age, where at that age is the right time to instill good habits to shape behavior in a child. Pre-school age children are the ideal age to practice their motor skills, one of which is brushing their teeth.

There are several factors that affect the degree of dental and oral health of children, namely knowledge and behavior of parents, environment and health services. To overcome these problems, especially children's dental and oral health, special attention and treatment are needed16,17. Children spend most of their time at school, so that the development of health promotion knowledge and behavior can be appropriate when carried out at school. Children's interventions carried out at schools aim to enable children to learn about dental and oral health as early as possible to increase children's knowledge about the importance of maintaining health, especially dental and oral health18.

The environment plays a role in shaping the attitudes and behavior of pre-school aged children, especially in their immediate environment, namely the family and school environment. Children's dental health cannot be separated from the role of their parents, the role of parents is very important as the basis for forming children's behavior in maintaining healthy teeth and mouth19,20. Dental and oral care from pre-school age supports children's dental health in the future. Dental care is done to prevent tooth decay, tooth abnormalities, and other diseases. Dental care from an early age is intended to provide and instill good habits for children to always pay attention to the health condition of their teeth and mouth. Dental care requires the active role of parents, and early dental care can provide knowledge to parents because milk teeth greatly affect permanent teeth21. In addition to the role of parents, the role of teachers in schools can shape dental care behavior from childhood by changing and shaping behavior. Behavior change here is the behavior of maintaining oral hygiene/health. This behavior change is included in the fundamental problems for children's dental and oral health and is the focus of this research. The thing that underlies this change in behavior begins with an increase in students' knowledge22,23. Behavior change here is the behavior of maintaining oral hygiene/health. This behavior change is included in the fundamental problems for children's dental and oral health and is the focus of this research. The thing that underlies this change in behavior begins with an increase in students' knowledge22,23. Behavior change here is the behavior of maintaining oral hygiene/health. This behavior change is included in the fundamental problems for children's dental and oral health and is the focus of this research. The thing that underlies this change in behavior begins with an increase in students' knowledge22,23.

Factors that influence the risk of caries in children include the following: acts of consuming cariogenic food and drink, attitude to maintain oral hygiene, parental knowledge, health services, environmental factors of residence, plaque index and salivary pH. Health services are an indirect factor that can be in the form of promotion of dental and oral health which can be improved to provide knowledge and insight for parents of children and to improve children's dental and oral health8,24. Another factor is the behavior of maintaining oral and dental health for parents, teachers, and dental hygiene of pre-school age children who want to be addressed through this research.

Dental and oral health knowledge for parents of students through promotive efforts, because knowledge is a predisposing factor that influences health behavior and a person's behavior about health is determined by knowledge10. The role of UKGS can also assist in overcoming dental and oral health problems in children. School Dental Health Efforts (UKGS) is an effort aimed at maintaining and improving the dental and oral health of students in target schools supported by individual health efforts in the form of curative efforts for students who need dental and oral health care16. The way to maintain dental and oral health for pre-school-age children is to increase the knowledge of parents of students and always invite them to maintain it by brushing their teeth regularly, limit consumption of cariogenic foods, and check the condition of their children's teeth and mouth to health services10. Health promotion can take advantage of industry 4.0 by using digital learning technology through gadgets25.

The level of knowledge, attitudes, and actions of preschool children regarding the level of dental and oral health maintenance is still at a low level due to a lack of knowledge regarding dental and oral health maintenance26. According to research by Subekti, et al., 201826, which was conducted at Mutiara Early Childhood Education, data on the level of knowledge, behavior, and level of dental hygiene were obtained. The research resulted in changes at the level of knowledge and behavior. Before the intervention, the level of knowledge in good criteria was 18%, moderate was 65%, and bad was 18%, after the intervention, there was a change in the level of knowledge with good criteria of 80%, medium 15%, and bad 5%. Before the intervention, the level of tooth brushing behavior with good criteria was 20%, moderate 53%, and bad 8%,

Changes in behavior can occur because of exercises or activities that are carried out repeatedly consciously without coercion and have directions and goals that cover all aspects of behavior, namely knowledge, actions and attitudes. In addition, the level of knowledge, attitudes, and actions of teachers/parents of preschool children on the level of dental health care varies. Research by (Muhtar, et al., 2020) found that the level of knowledge of parents in the Nusa Indah Berangas Kindergarten, Alalak District, Barito Regency was in the moderate criteria of 59% and the child's dental and oral hygiene level was in the bad criteria of 69%28.

The Industrial Age 4.0 is a term used to refer to an era where there is a combination of technologies which results in physical, biological and digital dimensions forming a combination that is difficult to distinguish. The occurrence of digitalization of information and the massive application of Artificial Intelligence in various sectors of human life, including in the world of education and health, is a sign of the start of the 4029 industrial era.

One of the sectors affected by the industrial era 4.0 is the health sector. This sector is starting to be combined with technology to form a better mix. The unification of technology becomes a new area consisting of three fields of science, namely physics, biology and digital30. Examples of technology implementation in the health sector include the use of AI and big data, information systems, and the use of AR and VR31,32. One of the benefits derived from using AR is as a medium for teaching health materials 32 .

Augmented Reality (AR) technology is a technology that can naturally combine virtual objects and real objects through a computerized process, so as to produce real objects as if they were in front of the user33. Augmented Reality is divided into two, namely Marker-based and Markerless. Marker is a marker to recognize Augmented Reality objects. The way Augmented Reality works is tracking and reconstruction. Initially the marker is detected by the camera, then the data obtained from the tracking process is reconstructed into the real world34. The application of AR in the health sector can be in the form of learning body and oral anatomy, dental health education, and simulations for operating on patients33.

AR has the advantage of being a 3D model that is detailed, can be animated, can be moved, so that it can attract the interest of kindergarten students, parents and teachers. AR, which has a detailed 3D model, is expected to provide in-depth knowledge to kindergarten students, parents and teachers35. AR is also easy to implement widely, relatively inexpensive, and interactive36. The advantage of AR in this study is that it has complementary materials in the form of illustrated books that parents and teachers can easily read to kindergarten children, besides that the 3D models in this study can be moved and animated to provide a more detailed picture.

The content concept in this study is to combine AR and children's illustrated books. This content can later be scanned/scanned by the AR application and displays the form of a 3D model. With the 3D model, it is hoped that parents and teachers will understand more because the 3D model explains the inside of the mouth in detail. The content presented is in the form of book illustrations and 3D models that can display the inside of the mouth, tongue, gums and teeth which are expected to provide in-depth knowledge for children, parents and teachers. This in-depth knowledge that researchers believe can change behavior.

Based on this background, researchers are interested in conducting research on the augmented reality book model as an educational medium in improving dental health maintenance behavior for parents and dental hygiene in pre-school age children.

II. MATERIALS AND METHODS

This type of research is a mix method with R&D research design. The population in this study were students of Pelangi Kindergarten and Al-Manar Kindergarten, Cirebon City. The sample used was 40 children who were divided into two groups, namely Pelangi Kindergarten students as the intervention group of 20 children and AL-Manar Kindergarten students as the control group of 20 children who met the inclusion and exclusion criteria, as well as 4 teachers and parents who attended the total. child. Data analysis was performed with univariate, bivariate and multivariate analysis.

III. RESULTS AND DISCUSSION

A. Univariate analysis

The study was conducted on 40 respondents aged 5-6 years consisting of 20 students at Pelangi Kindergarten as the intervention group and 20 students at Al-Manar Kindergarten as the control group. The general description of the respondents is presented in the following table:

No	Characteristics	Intervention Group		Control Group		p-values
		N	%	N	%	
1	Gender of child					
	Man	10	50	10	50	0.067
	Woman	10	50	10	50	
	Total	20	100	20	100	
2	Child Age					
	4 years	6	30	6	30	0.154
	5 years	7	35	7	35	
	6 years	7	35	7	35	
	Total	20	100	20	100	
3	Mother's Education					
	Elementary school	1	5	1	5	0.161
	Junior High School	2	10	5	25	
	Senior High School	8	40	10	50	
	Bachelor	9	45	4	20	
	Total	20	100	20	100	
4	Mother's job					
	Work	17	85	7	35	0.059
	Doesn't work	3	15	13	65	
	Total	20	100	20	100	

Table 1: Frequency Distribution of Intervention and Control Respondent Characteristics

The results of the frequency test for the characteristics of the respondents in table 1 on the sex data of the intervention group and the control group obtained a p-value of 0.067 (> 0.05) so that it can be concluded that the sexes in this study had the same proportions. In the age data, the p-value is 0.154 (> 0.05), which means that the data groups have the same variation. Mother's education has a p-value of 0.161 (> 0.05) so it can be concluded that mother's education has the same proportion. Furthermore, the percentage of mothers in the intervention group and the control group were mostly employed, in the intervention group it was 85% while in the control group it was 65% with a p-value (> 0.05) which means that the data groups have the same variation (homogeneous).

Group	Variable	Means	Difference value	SD	Min	Max
Intervention	Knowledge of pre-test children	6.15	1.05	0.671	5	7
	Knowledge of post-test children	7.20		0.894	5	8
	Attitude of pre-test children	16.45	11.4	1,572	15	20
	Attitude of post-test children	27.85		1,496	25	30
	Pre-test children's actions	4.30	3.6	1,174	3	6
	Actions of post-test children	7.90		1971	3	10
	Plaque child pre-test	80.52	-38.43	8,371	25	80
	Plaque child post-test	42.09		13.00	54	90
Control	Knowledge of pre-test children	3.95	0.3	0887	2	6
	Knowledge of post-test children	4.25		0.786	3	6
	Attitude of pre-test children	16.25	0.45	0.851	15	18
	Attitude of post-test children	16.70		1.218	15	20
	Pre-test children's actions	3.95	0.25	0.759	3	5
	Actions of post-test children	4.20		0.696	3	5
	Plaque child pre-test	67.10	14.78	14.23	30	82
	Plaque child post-test	52.32		17.69	40	85

Table 2: Average Value of Knowledge, Attitudes, Actions and Children's Plaque Scores in the Intervention Group and the Control Group

The descriptive results of table 2 show that the mean value of children's knowledge in the intervention group increased from 6.15 to 7.20 and for the control group it increased from 3.95 to 4.25. The mean value of children's attitudes in the intervention group increased from 16.45 to 27.85 and for the control group increased from 16.25 to 16.70. The mean value of children's actions in the intervention group increased from 4.30 to 7.90 and for the control group increased from 3.95 to 4.20. The mean plaque score of children in the intervention group decreased from 80.52 to 42.09 and for the control group it decreased from 67.10 to 52.32.

Group	Variable	Means	Difference value	SD	Min	Max
Intervention	Mother's knowledge pre-test	5.55		1,317	3	7
	Mother's knowledge post-test	7.65	2.1	0.671	7	9
	Mother's attitude pre-test	30.95	11.45	0.999	30	33
	Post-test mother's attitude	42.40		0.995	40	44
	Mother's action pre-test	6.10	2.65	1,586	4	9
	Post-test maternal action	8.75		0.639	8	10
Control	Mother's knowledge pre-test	4.25	0.8	0.085	3	5
	Mother's knowledge post-test	5.05		0.826	4	6
	Mother's attitude pre-test	25.20	2.9	1.105	24	27
	Post-test mother's attitude	28.10		1,447	26	31
	Mother's action pre-test	4.45	4.15	0.826	3	6
	Post-test maternal action	8.60		0.883	7	10

Table 3: Average Value of Mother's Knowledge, Attitudes and Actions in the Intervention Group and the Control Group

The descriptive results of table 3 show that the mean value of mothers' knowledge in the intervention group increased from 5.55 to 7.65 and for the control group it increased from 4.25 to 5.05. The mean value of the mother's attitude in the intervention group increased from 30.95 to 42.40 and for the control group increased from 25.20 to 28.10. The mean value of maternal action in the intervention group increased from 6.10 to 8.75 and for the control group it increased from 4.45 to 8.60.

Group	Variable	Means	Difference value	SD	Min	Max
Intervention	Teacher knowledge pre-test	5.55		1,317	3	7
	Post-test teacher knowledge	7.65	2.1	0.671	7	9
	Pre-test teacher attitude	30.95	11.45	0.999	30	33
	Post-test teacher attitude	42.40		0.995	40	44
	Pre-test teacher action	6.10	2.65	1,586	4	9
	Post-test teacher action	8.75		0.639	8	10
Control	Teacher knowledge pre-test	4.25	0.8	0.085	3	5
	Post-test teacher knowledge	5.05		0.826	4	6
	Pre-test teacher attitude	25.20	2.9	1.105	24	27
	Post-test teacher attitude	28.10		1,447	26	31
	Pre-test teacher action	4.45	4.15	0.826	3	6
	Post-test teacher action	8.60		0.883	7	10

Table 4: The Average Value of Teacher Knowledge, Attitudes and Actions in the Intervention Group and the Control Group

The descriptive results of table 4 show that the mean value of teacher knowledge in the intervention group increased from 5.55 to 7.65 and for the control group it increased from 4.25 to 5.05. The mean value of teacher attitudes in the intervention group increased from 30.95 to 42.40 and for the control group it increased from 25.20 to 28.10. The mean value of teacher action in the intervention group increased from 6.10 to 8.75 and for the control group it increased from 4.45 to 8.60.

B. Bivariate Analysis
➢ The Effectiveness of the Augmented Reality Book Model in Children

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
	Paired Data Test*		
Intervention	6.15+0.671	7.20+0.894	0.001
Control	3.95+0.887	4.25+0.786	0.130
	Mean±SD Pre-Test	Mean±SD Pre-Test	
	Unpaired Data Test**		
Intervention	6.15+0.671	7.20+0.894	
Control	3.95+0.887	4.25+0.786	
p-values	0.002	0.001	
	Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test		
Intervention	1.94 ± 2.429		0.001
Control	1.69 ± 3.525		

Table 5: Test of the Effectiveness of Children's Knowledge in the Intervention Group and the Control Group
*Wilcoxon **Mann-Whitney

The results of the effectiveness test of paired data on children's knowledge showed that the p-value of the intervention group was 0.001 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in increasing knowledge of dental health maintenance in pre-school-aged children. The p-value for the knowledge of the control group was 0.130 (p>0.05), meaning that the model used in the control group was not effective in increasing the knowledge of pre-school-aged children.

Unpaired data test results The p-value pre-test of the intervention group and the control group differed significantly where the p-value was 0.002 (p <0.05) for the post-test p-value of the intervention group and the control group was significantly different significantly, namely

0.001 (p <0.05), meaning that the dental and oral health maintenance education model used in the control group was effective in increasing the knowledge of pre-school-aged children.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, it was seen that the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in increasing children's knowledge in maintaining dental and oral health in children aged preschool compared to the control group. This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 1.94 and the control group is 1.69.

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
Paired Data Test*			
Intervention	16.45+1.572	27.85+1.496	0.002
Control	16.25+0.851	16.70+1.218	0.011
	Mean±SD Pre-Test	Mean±SD Pre-Test	
Unpaired Data Test**			
Intervention	16.45+1.572	27.85+1.496	
Control	16.25+0.851	16.70+1.218	
p-values	0.779	0.001	
Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test			
Intervention	8.21 ± 1.34		0.001
Control	5.19 ± 0.57		

Table 6: Test of the Effectiveness of Children's Attitudes in the Intervention Group and the Control Group

*Wilcoxon **Mann-Whitney

The results of the effectiveness test on the paired data on children's attitudes showed that the p-value of the intervention group was 0.002 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in improving dental health care attitudes in pre-school-aged children. The p-value of the control group's knowledge was 0.011 (p <0.05) meaning that the model used in the control group was effective in increasing the knowledge of pre-school-aged children.

The results of the unpaired data test were that the p-value pre-test of the intervention group and the control group was not significantly different where the p-value was 0.779 (p>0.05) for the post-test p-value of the intervention group and the control group significantly different significant, namely 0.001 (p <0.05), meaning that the dental and oral health maintenance education model used in the control group was effective in increasing the knowledge of pre-school-aged children.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, it was seen that the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in increasing children's attitudes in maintaining dental and oral health in children aged preschool compared to the control group. This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 8.21 and the control group is 5.19.

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
	Paired Data Test*		
Intervention	4.30 + 1.174	7.90 + 1.971	0.001
Control	3.95 + 0.759	4.20 + 0.696	0.025
	Mean±SD Pre-Test	Mean±SD Pre-Test	
	Unpaired Data Test**		
Intervention	4.30 + 1.174	7.90 + 1.971	
Control	3.95 + 0.759	4.20 + 0.696	
p-values	0.478	0.001	
	Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test		
Intervention	1.60 ± 1.775		0.001
Control	0.91 ± 3.878		

Table 7: Test the Effectiveness of Children's Actions in the Intervention Group and the Control Group

*Wilcoxon **Mann-Whitney

The results of the effectiveness test of paired child action data showed that the p-value of the intervention group was 0.001 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in improving dental health maintenance actions in pre-school aged children. The p-value of the control group's actions was 0.025 (p <0.05) meaning that the model used in the control group effectively increased the actions of pre-school-aged children.

The results of the unpaired data test the p-value pre-test of the intervention group and the control group were not significantly different where the p-value was 0.478 (p>0.05) for the post-test p-value of the intervention group and the control group significantly different significant,

namely 0.001 (p <0.05), meaning that the dental and oral health maintenance education model used in the control group was effective in increasing the actions of pre-school-age children.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, it was seen that the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in increasing children's actions in maintaining dental and oral health in children aged preschool compared to the control group. This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 1.60 and the control group is 0.91.

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
	Paired Data Test*		
Intervention	80.52 + 83.71	42.09 + 13.00	0.002
Control	67.10 + 14.23	52.32 + 17.69	0.025
	Mean±SD Pre-Test	Mean±SD Pre-Test	
	Unpaired Data Test**		
Intervention	80.52 + 83.71	42.09 + 13.00	
Control	67.10 + 14.23	52.32 + 17.69	
p-values	0.035	0.001	
	Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test		
Intervention	8.21 ± 1.34		0.001
Control	5.19 ± 0.57		

Table 8: Effectiveness Test of Children's Plaque Value in the Intervention Group and the Control Group

*Wilcoxon **Mann-Whitney

The results of the paired data effectiveness test for children's plaque scores showed that the p-value of the intervention group was 0.002 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in reducing plaque scores in pre-

school-aged children. The p-value of the control group's plaque score was 0.025 (p <0.05) meaning that the model used in the control group effectively reduced the plaque score of pre-school-aged children.

The results of the unpaired data test showed that the p-value pre-test for the intervention group and the control group differed significantly, where the p-value was 0.035 (p <0.05) for the post-test p-value for the intervention group and the control group. significantly, namely 0.001 (p <0.05), meaning that the dental and oral health care education model used in the control group was effective in reducing the plaque score of pre-school-aged children.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in reducing plaque scores in pre-school-aged children compared to the control group . This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 8.21 and the control group is 5.19.

C. The Effectiveness of the Augmented Reality Book Model for Mothers

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
Paired Data Test*			
Intervention	5.55+1.317	7.65+0.671	0.001
Control	4.25+0.085	5.05+0.826	0.003
	Mean±SD Pre-Test	Mean±SD Pre-Test	
Unpaired Data Test**			
Intervention	5.55+1.317	7.65+0.671	
Control	4.25+0.085	5.05+0.826	
p-values	0.001	0.001	
Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test			
Intervention	1.64 ± 1.429		0.001
Control	1.19 ± 2.525		

Table 9: Test of the Effectiveness of Mother's Knowledge in the Intervention Group and the Control Group

*Wilcoxon **Mann-Whitney

The results of the paired data effectiveness test on maternal knowledge showed that the p-value of the intervention group was 0.001 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in increasing maternal dental health care knowledge. The p-value of the control group's knowledge was 0.003 (p <0.05) meaning that the model used in the control group was effective in increasing mothers' knowledge.

Unpaired data test results The p-value pre-test of the intervention group and the control group differed significantly where the p-value was 0.001 (p <0.05) for the post-test p-value of the intervention group and the control group was significantly different significantly, namely 0.001 (p <0.05), meaning that the dental and oral health maintenance education model used in the control group was effective in increasing mother's knowledge.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, it was seen that the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in increasing mother's knowledge in maintaining dental and oral health compared to the group control. This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 1.64 and the control group is 1.19.

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
	Paired Data Test*		
Intervention	30.95+0.999	42.40+0.995	0.002
Control	25.20+1.105	28.10+1.447	0.011
	Mean±SD Pre-Test	Mean±SD Pre-Test	
	Unpaired Data Test**		
Intervention	30.95+0.999	42.40+0.995	
Control	25.20+1.105	28.10+1.447	
p-values	0.002	0.001	
	Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test		
Intervention	7.21 ± 1.64		0.001
Control	5.29 ± 0.58		

Table 10: Test of the Effectiveness of Mother's Attitudes in the Intervention and Control Groups

*Wilcoxon **Mann-Whitney

The results of the effectiveness test on paired data on maternal attitudes showed that the p-value of the intervention group was 0.002 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in improving maternal dental health care attitudes. The p-value for the attitude of the control group was 0.011 (p <0.05) meaning that the model used in the control group was effective in increasing the attitude of mothers.

Unpaired data test results The p-value pre-test of the intervention group and the control group differed significantly where the p-value was 0.002 (p <0.05) for the post-test p-value of the intervention group and the control group was significantly different significantly 0.001

(p<0.05) meaning that the dental and oral health maintenance education model used in the control group was effective in increasing the mother's attitude.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, it was seen that the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in increasing the attitude of mothers in maintaining dental and oral health compared to the group control. This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 7.21 and the control group is 5.29.

Group	Mean±SD Pre-Test	Mean±SD Post-Test	p-values
	Paired Data Test*		
Intervention	6.10 + 1.586	8.75 + 0.639	0.001
Control	4.45 + 0.826	8.60 + 0.883	0.002
	Mean±SD Pre-Test	Mean±SD Pre-Test	
	Unpaired Data Test**		
Intervention	6.10 + 1.586	8.75 + 0.639	
Control	4.45 + 0.826	8.60 + 0.883	
p-values	0.001	0.478	
	Unpaired Data Test Change Value (Δ)** Mean±SD Pre-Post Test		
Intervention	1.91 ± 1.775		0.001
Control	1.51 ± 3,878		

Table 11: Test of the Effectiveness of Mother's Actions in the Intervention and Control Groups

*Wilcoxon **Mann-Whitney

The results of the effectiveness test on paired data on maternal actions showed that the p-value of the intervention group was 0.001 (p <0.05) meaning that the augmented reality book model was effective as an educational medium in increasing maternal actions in maintaining dental health. The p-value of the control group's actions was 0.002 (p

<0.05) meaning that the model used in the control group effectively increased the mother's actions.

Unpaired data test results The p-value pre-test of the intervention group and the control group differed significantly where the p-value was 0.001 (p <0.05) for the

post-test p-value of the intervention group and the control group did not differ significant, namely 0.478 (p> 0.05), meaning that the dental and oral health care educational model used in the control group was not effective in increasing the mother's behavior.

The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different, it was seen that the p-value was 0.001 (p <0.05) meaning that the augmented reality book model was more effective in increasing the mother's actions in maintaining dental and oral health compared to the group control. This is evidenced by the average value of change (Δ) in the intervention group which is better than the model used in the control group, namely the intervention group is 1.91 and the control group is 1.51.

D. The Effectiveness of the Augmented Reality Book Model for Teachers

➢ *Teacher Knowledge in the Intervention Group and Control Group*

Based on the results of the study showed that there was an increase in teacher knowledge before and after being given treatment, where before being given treatment the average value of teacher knowledge was 5.55 in the intervention group increased to 7.65, in the control group the average value before being given treatment was 4.25 increased to 5.05. It showsthe augmented reality book model is effective as an educational medium in increasing teachers' dental health maintenance knowledge. When observed from the answers to the questionnaire, most of the teachers already knew about dental caries, the best way to remove plaque, and the right time and method of brushing their teeth. The difference in increasing teacher knowledge was 1.64, and the difference in increasing teacher knowledge in the control group was 1.19.

➢ *Teacher Attitudes in the Intervention Group and Control Group*

Based on the results of the study showed that there was an increase in teacher attitudes before and after being given treatment, where before being given treatment the average value of teacher attitudes was 30.95 in the intervention

group increased to 42.40, in the control group the average value before being given treatment was 25.20 increased to 25.20 28.10. It showsthe augmented reality book model is effective as an educational medium in improving teachers' dental health care attitudes. When observed from the answers to the questionnaire, most of the teachers have been supportive such as the teacher has accompanied the child to brush their teeth, the teacher supports brushing their teeth at least 2 times a day, using toothpaste containing flour and so on. The difference in increasing teacher knowledge was 7.21, and the difference in increasing teacher knowledge in the control group was 5.29.

➢ *Teacher Actions in the Intervention Group and Control Group*

Based on the results of the study showed that there was an increase in teacher actions before and after being given treatment, where before being given treatment the average value of teacher actions was 6.10 in the intervention group increased to 8.75, in the control group the average value before being given treatment was 4.45 increased to 8.60. It showsthe augmented reality book model is effective as an educational medium in improving teachers' dental health maintenance actions. When observed from the answers to the questionnaire, most of the teachers had prepared tools and materials for brushing their teeth, poured toothpaste about the size of corn kernels, rinsed their mouths with clean water before brushing their teeth and so on. The difference in the increase in teacher action was 1.91, and the difference in the increase in teacher knowledge in the control group was 1.51.

E. Multivariate Analysis

To find out the intermediate variables that affect the dental hygiene status of preschool-aged children. The intermediate variable used in the multivariate test is only the parent variable, while the teacher variable is not used because the data is not balanced. The test used is a multiple linear regression test obtained from the delta pretest and posttest 1. The test results can be seen in the following table:

Variable	B	p-values	R	R-Square	Adjusted R-Square	C	p-value ANOVA
Knowledge	2,894	0.024	0.592	0.696	0.669	10:20 p.m	0.001
Attitude	0.521	0.320					
Action	0.510	0.001					

Table 12: Intermediate variables on the dental hygiene status of preschool-aged children.

Linear Regression

Based on table 4.19, it can be seen that the constant value is 22.20 with a knowledge coefficient of 2.894 meaning that an increase in the value of parental knowledge of 1% will increase the dental hygiene status of preschoolers by 2.894. The attitude coefficient value is 0.521, meaning that an increase in the value of parental attitudes by 1% will increase the dental hygiene status of preschoolers by 0.521 and the action coefficient value is 0.510, meaning that an increase in the value of parental

actions by 1% will increase the dental hygiene status of preschoolers by 0.511.

The results of the analysis showed R = 0.592, meaning that there was a very strong and very significant correlation between knowledge, attitudes and actions of parents and the dental hygiene status of preschoolers while the results of R2 (R Square) were 0.696 or (69.6%), meaning knowledge, attitude , parents' actions have an influence of 69.6% on the dental hygiene status of

preschoolers. The results of the analysis also showed that the value of p = 0.001 means that there is an influence of knowledge, attitudes and actions of parents on the dental hygiene status of preschool children. The test results for each parent's actions (p=0.001), parental knowledge (p=0.024) and attitude (0.320).

➢ *Test the knowledge of preschool age children*

The results showed that the value of children's knowledge in the intervention group increased from 6.15 to 7.20 and for the control group increased from 3.95 to 4.25. The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different with a p-value <0.05 meaning that the augmented reality book model was more effective in increasing children's knowledge in maintaining dental and oral health in pre-school-aged children compared to the group control. Judging from the results of the analysis of filling out the questionnaire, it is known that after the treatment, the children know that fruits are foods that can nourish their teeth, the right time to brush their teeth is in the morning after breakfast and at night before going to bed. perforated.

Dental and oral health knowledge is important in forming a healthy attitude. Good knowledge will have an impact on the behavior of caring for good dental and oral health as well. Dental and oral health is a fundamental part of general health and well-being. Dental and oral health is a part of body health that cannot be separated from one another, because dental and oral health will affect the health of the body. Dental and oral health education is an effort made with the aim of changing the habits of a person, group of people or the community so that they have knowledge, attitudes and habits to behave in a healthy life in the field of dental and oral health. The purpose of dental and oral health counseling is to increase individual and community empowerment so that they can improve the level of dental health better in the future. Dental health education is not only the responsibility of the government, but is the responsibility of all parties. Counseling can increase a person's knowledge and abilities through learning practice techniques or instructions that aim to change human attitudes, both individually, in groups and in society in order to increase awareness of the value of dental and oral health.[74].

Augmented *reality*is one of the fields of Human-Computer Interaction (HCI) which until now has been frequently researched and continues to experience various kinds of developments and is used in various fields such as health, manufacturing, learning, and entertainment.[64]. This augmented reality can combine the real world with the virtual world in 3D and is interactive according to real time (real time).[65]. The advantages of augmented reality media are that it helps children to be more interactive, how to use it more effectively and efficiently, it can be used by all groups including children, it uses simple objects because it only displays a few objects, the manufacturing process does not take a long time, it is easy to operate on preschool age children. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children.

Augmented reality makes it easier for children to better understand what is being taught.

In line with research conducted by Putri in 2021 showed that there was an effect of giving AR Book media on increasing knowledge of balanced nutrition (p≤0.0001) and balanced nutrition attitudes (p≤0.001)[75]. Conclusion: The AR Book media for balanced nutrition can be used as a medium that has an effect on increasing knowledge and attitudes on balanced nutrition in school-age children. In addition, research that has been conducted by Rahmadani in 2021 also shows thatthe use of augmented reality technology is very effective as an educational tool as a learning medium to improve dental and oral health in children, using AR is proven to have a strong memory effect for its users, increase motivation, learning achievement, and not give the slightest feeling of anxiety[76].

According to Hidayat in 2015, in his research he stated that Augmented Reality is a relatively new technology and is still being developed today.[77]. The concept is to combine real-world dimensions with mediated 'real-world' dimensions, or virtual worlds, to create the impression that our real-world dimensions are enriched with three-dimensional virtual objects. This is done by 'drawing' a three-dimensional object on the marker, which is a 'pattern' in a rectangular frame that is unique and can be recognized by the application. The application in question receives input in the form of a video stream, which means using input in the form of images from hardware that functions to capture images, usually a webcam. Because it is a video stream, it means that the image captured as input will change, and the program must be able to recognize the marker even if it changes position and orientation relative to the input device. This recognition of position and movement is one of the Information Technology concepts called Computer Vision, and is used to detect movement patterns of objects relative to the camera. Education for children must be done as early as possible, especially in terms of health. Along with the development of public understanding of the importance of dental health, many parties have provided information related to dental health in various media. Not only adults are targeted but also starting from children who have been introduced to this knowledge. Because media delivery is needed for children, many educational media have emerged which are expected to be able to educate children in various ways. Utilization of Augmented Reality as a tool for educating children, This will provide a new perspective on existing educational media, not only using real objects but also using virtual objects in conveying information. The added value of this media is that it makes delivery easier and makes information more interesting, especially for children.

In early childhood dental health problems are the responsibility of a mother. This is understandable because generally the closest to the child from the age of breastfeeding is the mother. During childhood, it is still at the stage of requiring strict guidance, requiring extraordinary patience. Requires perfect wisdom. Requires a good way for a mother in educating a child90.

In early childhood the role of parents is very decisive. Parents must be responsible, because children still depend on their parents, especially a mother. Parental behavior correlates with the oral health of their children, for example, the habit of brushing the teeth of parents is directly related to their children, both in time and method. Parents' eating patterns are also imitated by children, such as eating food (snacking/snacking) and drinking sweet drinks between meals90.

A mother with good self-confidence and self-respect, willing to listen, who actively intervenes at home to give her child freedom and encourages socialization for her children, facilitates her ability to master herself in dental care more often has children who behave cooperatively on dental and oral health. Therefore it is not surprising that family behavior, especially mothers, was found to have more influence on children's behavior90.

If the children of a family are healthy, of course it is because the parents of that family can really pay attention to the health of their children. Because children are generally more of a mother's business, the good and bad of the child is reflected in the mother's attitude towards the child. Therefore, if in one family, the children's teeth are healthy, it may be concluded that the housewife of the family is a mother who is good at taking care of her household. In other words, a wise housewife is a housewife whose children's teeth are healthy90.

➢ *Test the attitude of preschool age children*

The results showed that the mean value of the child's attitude in the intervention group increased from 16.45 to 27.85 and for the control group increased from 16.25 to 16.70. The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different with a p-value <0.05 meaning that the augmented reality book model was more effective in improving children's attitudes in maintaining dental and oral health in pre-school-aged children compared to the group control. Judging from the analysis of the results of filling out the questionnaire, it can be seen that after being given treatment, most children understand better how to brush their teeth properly and properly and use a toothbrush and toothpaste properly.

Augmented reality is one of the fields of Human-Computer Interaction (HCI) which until now has been frequently researched and continues to experience various kinds of developments and is used in various fields such as health, manufacturing, learning, and entertainment.[64] This augmented reality can combine the real world with the virtual world in 3D and is interactive according to real time (real time).[65] Augmented reality can be used in the health sector by creating content according to what you want to convey. One of its uses in the health sector is in research conducted by Amirullah in 2021 entitled Augmented Reality Applications as Media for Education on Health Protocols and Information on the Spread of COVID-19 in Indonesia[66]. This research aims to apply AR technology to educational media on health protocols and information on the spread of Covid-19 in Indonesia. The design of this application gives rise to 3D models in the form of models washing hands, models wearing masks, and models keeping their distance[66].

The advantages of augmented reality media are that it helps children to be more interactive, how to use it more effectively and efficiently, it can be used by all groups including children, it uses simple objects because it only displays a few objects, the manufacturing process does not take a long time, it is easy to operate on preschool age children. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children. Augmented reality makes it easier for children to better understand what is being taught[66].

Everyone has different attitudes towards certain things (certain objects). Attitudes show judgments, feelings, and actions towards an object. Different attitudes occur because of the understanding, experience, and considerations that have been experienced by someone in an object. Therefore, the results of attitudes toward an object are positive (accepting) and negative (not accepting). Attitude is a pattern of behavior, tendency or anticipatory readiness, predisposition to adapt to social situations, or simply, attitude is a conditioned response to social stimuli. It can be said that the intended readiness is a potential tendency to react in a certain way when an individual is faced with a stimulus that requires a response.[78]

The emphasis on the concept of health counseling is more on efforts to improve the target's behavior so that it behaves healthy, especially cognitive aspects, so that the target knowledge of the counseling is in accordance with what is expected by the health educator, the next counseling will be carried out in accordance with the program that has been planned.[78] In this study it is known that augmented reality is effective in changing children's attitudes in maintaining dental and oral health.

In line with research conducted by Mustaqim in 2016 showing that the use of educational media using Augmented Reality can stimulate the mindset of students to think critically about problems and events that exist in everyday life, because the nature of educational media is to help students in the learning process with or the absence of educators in the educational process, so that the use of educational media with augmented reality can directly provide learning wherever and whenever students want to carry out the learning process[79]. AR Learning Media can visualize abstract concepts for understanding and the structure of an object model enabling AR as a more effective medium according to the objectives of the learning media. In addition, research conducted by Dewi in 2017 also shows that *augmented reality* (AR) is a combination of virtual (virtual) and real (real) worlds created by computers[80]. Virtual objects can be in the form of text, animation, 3D models or videos combined with the actual environment so that users feel that virtual objects are in their environment. The material that is visualized in augmented reality is IPS material which contains culture. The material is visualized in the form of images, 3D

models, text, and videos, so that students can easily understand the material presented. Augmented reality is effective in improving children's attitudes towards health care.

➢ *Action test of preschool age children*

The results showed that the mean value of children's actions in the intervention group increased from 4.30 to 7.90 and for the control group increased from 3.95 to 4.20. The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different with a p-value <0.05 meaning that the augmented reality book model was more effective in increasing children's actions in maintaining dental and oral health in pre-school-aged children compared to the group control. Judging from the analysis of the results of filling out the questionnaire, it is known that after being given treatment the children become more diligent in brushing their teeth at the right time, using the right toothbrush and toothpaste and consuming fruits/foods that are healthy for teeth more often.

Augmented reality compared to the media used in the control groupis one of the fields of Human-Computer Interaction (HCI) which until now has been frequently researched and continues to experience various kinds of developments and is used in various fields such as health, manufacturing, learning, and entertainment.64. This augmented reality can combine the real world with the virtual world in 3D and is interactive in real time. Augmented Reality aims to simplify things for the user by bringing virtual information into the user's environment81. AR enhances user perception and interaction with the real world. The following is an overview of the process of how augmented reality works using a webcam and a computer as the medium65.

In line with research conducted by Dewi in 2017also shows thataugmented reality(AR) is a combination of virtual (virtual) and real (real) worlds created by computers80. According to Dewi, virtual objects can be in the form of text, animation, 3D models or videos combined with the actual environment so that users feel that virtual objects are in their environment. The material that is visualized in augmented reality is IPS material which contains culture. The material is visualized in the form of pictures, 3D models, text, and videos, so that students can easily understand the material presented.80. Augmented reality is effective in increasing children's ability to understand the material being taught.

➢ *Preschool age children's plaque score test*

The results showed that the mean plaque score for children in the intervention group decreased from 80.52 to 42.09 and for the control group it decreased from 67.10 to 52.32. The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different with a p-value <0.05, meaning that the augmented reality book model was more effective in reducing children's plaque scores in maintaining dental and oral health in pre-school-aged children compared to control group. When viewed from changes in children's behavior,

both knowledge, attitudes and actions, this can support changes in plaque scores in children, where the more often children carry out maintenance of dental and oral health, the better the condition of dental and oral health.

The most important thing in maintaining oral hygiene is the awareness and behavior of maintaining personal oral hygiene. This is so important because the activities are carried out at home without any supervision from anyone, completely depending on the knowledge, understanding, awareness and willingness of the individual to maintain oral health. Maintenance of dental and oral health is closely related to plaque control or regular plaque removal[82].

One of the efforts to prevent dental and oral disease is the need to hold early dental health education for school children, because dental health education is a primary preventive measure before the occurrence of a disease. Dental health education plays an important role in schools, especially to increase students' awareness in maintaining their teeth so that they last a long time. Counseling can be regarded as a precursor to other dental health programs. Dental health education through counseling which is carried out on an ongoing basis aims to change behavior from aspects of unhealthy knowledge, attitudes and actions towards healthy behavior so as to achieve a good understanding of dental and oral health. To achieve the expected goals, counseling should be planned in advance. Dental health education for each child is different, this is adjusted to the child's age level. In the delivery of counseling, communication is very important because if the message conveyed is not on target then the counseling will not be successful[82].

Augmented reality compared to the media used in the control group is one of the fields of Human-Computer Interaction (HCI) which until now has been frequently researched and continues to experience various kinds of developments and is used in various fields such as health, manufacturing, learning, and entertainment.[64]. This augmented reality can combine the real world with the virtual world in 3D and is interactive according to real time (real time).[65]. The advantages of augmented reality media are that it helps children to be more interactive, how to use it more effectively and efficiently, it can be used by all groups including children, it uses simple objects because it only displays a few objects, the manufacturing process does not take a long time, it is easy to operate on preschool age children. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children. Augmented reality makes it easier for children to better understand what is being taught.

In line with research conducted by Rahmadani in 2021show thatthe use of augmented reality technology is very effective as an educational tool as a learning medium to improve dental and oral health in children, using AR is proven to have a strong memory effect for its users, increase motivation, learning achievement, and not give the slightest feeling of anxiety[76].

➢ *Knowledge test on mothers*

The results showed that the value of mother's knowledge in the intervention group increased from 5.55 to 7.65 and for the control group increased from 4.25 to 5.05. The results of the effectiveness test for unpaired data on the value of change (Δ) pre-post test were significantly different with a p-value <0.05, meaning that the augmented reality book model was more effective in increasing mothers' knowledge in maintaining dental and oral health compared to the control group. Judging from the results of filling out the questionnaire, it is known that, 80% of mothers already know about dental caries, the best way to remove plaque, and the right time and way to brush their teeth, while 20% of mothers still have a lack of understanding about when and how to brush their teeth properly. good and right. The difference in increasing mother's knowledge in the intervention group was 1.64, and the difference in increasing knowledge of mothers in the control group was 1.19. This can be interpreted that the mother's knowledge increases after being given treatment.

In pre-school age children the problem Dental health is a mother's responsibility. This is understandable because generally the closest to the child from the age of breastfeeding is the mother. During childhood, it is still at the stage of requiring strict guidance, requiring extraordinary patience. Requires perfect wisdom. Requires a good way for a mother in educating a child[83].

In pre-school age children, the role of parents is very decisive. Parents must be responsible, because children still depend on their parents, especially a mother. Parental behavior correlates with the oral health of their children, for example, the habit of brushing the teeth of parents is directly related to their children, both in time and method. Parents' eating patterns are also imitated by children, such as eating food (snacking/snacking) and drinking sweet drinks between meals[84].

A mother with good self-confidence and self-respect, willing to listen, who actively intervenes at home to give her child freedom and encourages socialization for her children, facilitates her ability to master herself in dental care more often has children who behave cooperatively on dental and oral health. Therefore it is not surprising that family behavior, especially mothers, was found to have more influence on children's behavior[83].

If the children of a family are healthy, of course it is because the parents of that family can really pay attention to the health of their children. Because children are generally more of a mother's business, the good and bad of the child is reflected in the mother's attitude towards the child. Therefore, if in one family, the children's teeth are healthy, it may be concluded that the housewife of the family is a mother who is good at taking care of her household. In other words, a wise housewife is a housewife whose children's teeth are healthy[85].

So that in this study parents/mothers also need learning related to maintaining dental and oral health. In this research already treatment of parents is carried out in order to increase knowledge, attitudes and actions of mothers by using the augmented reality book model. The results of the study show that augmented reality books are effective in increasing mothers' knowledge in maintaining dental and oral health, this can be caused by being more interactive, using them more effectively and efficiently, can be used by all groups including children, using simple objects because they only display a few objects , the manufacturing process does not take a long time, it is easy to operate for pre-school children. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children.

➢ *Attitude test on mother*

The results showed that the mean value of the mother's attitude in the intervention group increased from 30.95 to 42.40 and for the control group increased from 25.20 to 28.10. The results of the effectiveness test for unpaired data on the change in value (Δ) pre-post test were significantly different with a p-value <0.05, meaning that the augmented reality book model was more effective in improving the mother's attitude in maintaining dental and oral health compared to the control group. When observed from the answers to the questionnaire, most mothers have been supportive such as mothers accompanying children to brush their teeth, teachers support brushing their teeth at least 2 times a day, using toothpaste containing flour and so on.

Behavioral factors play an important role in influencing the health of a person's teeth and mouth, including how to maintain dental hygiene by brushing teeth. Dental care is an attempt to prevent tooth decay and gum disease. Dental care is very important because it can prevent caries, reduce pain in children, infection, and even malnutrition. The formation of children's behavior starts from home, namely by teaching their children to want to start good habits or even children who adopt mother's behavior. Adoption of behavior starts with children's activities at home, especially for mothers who do a lot of activities at home so that they meet their children more often than mothers who work outside the home. Motivation for good behavior from mother to child is equally important. this can be a place for correction for the child and the mother to sort out habits that are good and suitable for both of them, besides that the relationship between mother and child will be more intimate and more positive. The behavior, attitudes and attention of a mother is learning material for children, both consciously and unconsciously by their own mother. Therefore, it can be concluded that the mother is the first educator for the child[86].

So that in this study parents/mothers also need learning related to maintaining dental and oral health. In this study, the treatment of parents was carried out in order to improve the mother's attitude using the augmented reality book model. The results of the study show that augmented reality books are effective in increasing the knowledge, attitudes and actions of mothers in maintaining dental and oral health. only displays a few objects, the manufacturing process does not take a long time, it is easy to operate for pre-school aged children. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children. Augmented reality makes it easier for children to better understand what is being taught.

➢ *Action test on the mother*

The results showed that the mean value of the mother's actions in the intervention group increased from 6.10 to 8.75 and for the control group increased from 4.45 to 8.60. The results of the effectiveness test of the unpaired data change value (Δ) pre-post test were significantly different with a p-value <0.05, meaning that the augmented reality book model was more effective in increasing the knowledge, attitudes and actions of mothers in maintaining dental and oral health compared to the control group . When observed from the answers to the questionnaire, most of the mothers had prepared tools and materials for brushing their teeth, poured toothpaste about the size of corn kernels, rinsed their mouths with clean water before brushing their teeth and so on.

The role of parents is very important as a basis for the formation of behavior that supports or does not support children's dental and oral hygiene. Green in Afiati (2017) tries to analyze human behavior from the health level[19]. The health of a person or community is influenced by two main factors. The behavior itself is determined by 3 factors, namely: predisposing factors which consist of knowledge, attitudes, beliefs, values, behavior, and socioeconomics that underlie changes in behavior; Enabling factors are manifested in the physical environment which includes the availability or absence of health facilities and services, reinforcing factors manifested in the attitudes and behavior of health workers or other officers, family, teachers, friends, and so on which constitute the reference group. of societal behavior.

Parents with low knowledge about dental and oral health are a predisposing factor for behavior that does not support the child's dental and oral health, but many parents still think that primary teeth are less important, because they are temporary and will be replaced by permanent teeth which under normal circumstances will be forever in the oral cavity. This assumption is certainly very wrong considering the role and function of the primary teeth. It is during this period of primary teeth that children must begin to be taught to maintain the cleanliness and health of their teeth[19].

So that in this study parents/mothers also need learning related to maintaining dental and oral health. In this study, the treatment of parents was carried out in order to improve the mother's actions using the augmented reality book model. The results of the study show that augmented reality books are effective in increasing the knowledge, attitudes and actions of mothers in maintaining dental and oral health. only displays a few objects, the manufacturing process does not take a long time, it is easy to operate for preschoolers. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children. Augmented reality makes it easier for children to better understand what is being taught.

➢ *Knowledge test on teachers*

Based on the results of the study showed that there was an increase in teacher knowledge before and after being given treatment, where before being given treatment the average value of teacher knowledge was 5.55 in the intervention group increased to 7.65, in the control group the average value before being given treatment was 4.25 increased to 5.05. This shows that the augmented reality book model is effective as an educational medium in increasing teachers' dental health maintenance knowledge. When observed from the answers to the questionnaire, most of the teachers already knew about dental caries, the best way to remove plaque, and the right time and method of brushing their teeth. The difference in increasing teacher knowledge was 1.64, and the difference in increasing teacher knowledge in the control group was 1.19.

Behavior, awareness, and knowledge about maintaining dental health in Indonesia is still lacking. This is influenced by various education, environment, economy, traditions, and others. Health promotion is one of the programs that is being intensively implemented by the world health organization, the World Health Organization (WHO) implemented by governments in various parts of the world, including Indonesia, to improve the health quality of the Indonesian people. Children are one component of society. Children at school age are vulnerable to various health problems, such as dental caries, visual acuity disorders, nutrition, and others. Therefore, starting school is an important stage for developing children's habits to always maintain health from an early age through health education programs.[87]

Children's dental and oral health is generally found to be in poor condition with the presence of plaque and other deposits on the tooth surface. Plaque accumulation will cause an increase in carbohydrate fermentation by acidogenic bacteria, which will then cause the salivary pH to decrease, if the salivary pH drops to a critical threshold it will cause demineralization of enamel which will then cause caries on the teeth. One of the factors causing caries in children is the lack of knowledge about when to brush their teeth and how to brush their teeth properly[87].

Children spend most of their time at school, so the development of a healthy environment and the adoption of health-promoting behaviors are appropriate in schools. School student intervention is carried out with the aim that learning about dental hygiene and health can be carried out as early as possible to increase student knowledge about the importance of maintaining health, especially dental and oral health as well as body and environmental health in general. In addition, the teacher component is the best promoter of educational activities because they are familiar with the methods of educating and motivating school students. This is in line with the contents of Law No. 14 of 2005 concerning teachers and lecturers, Article 1 states that teachers are professional educators with the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in early childhood education through formal education, basic education, and secondary education. In addition, it is stated in article 10 that the competence of a teacher includes pedagogical competence, personal competence, social competence, and professional competence obtained through professional education. The teacher's guidance for children to get used to brushing their teeth after eating or snacking during lunch breaks is expected to be able to follow the child's plaque index and will carry over into the child's daily behavior and professional competence obtained through professional education. The teacher's guidance for children to get used to brushing their teeth after eating or snacking during lunch breaks is expected to be able to follow the child's plaque index and will carry over into the child's daily behavior and professional competence obtained through professional education. The teacher's guidance for children to get used to brushing their teeth after eating or snacking during lunch breaks is expected to be able to follow the child's plaque index and will carry over into the child's daily behavior[88].

So that in this study a teacher also needs learning related to maintaining dental and oral health. In this study, the treatment of teachers was carried out in order to increase the knowledge, attitudes and actions of teachers using the augmented reality book model. The results of the study show that augmented reality books are effective in increasing the knowledge, attitudes and actions of teachers in maintaining dental and oral health. only displays a few objects, the manufacturing process does not take a long time, it is easy to operate for pre-school aged children. In this study it has been proven that augmented reality can increase children's knowledge, attitudes, actions and reduce plaque scores in pre-school children. Augmented reality makes it easier for children to better understand what is being taught

➢ *Attitude test on the teacher*

Based on the results of the study showed that there was an increase in teacher attitudes before and after being given treatment, where before being given treatment the average value of teacher attitudes was 30.95 in the intervention group increased to 42.40, in the control group the average value before being given treatment was 25.20 increased to 25.20 28.10. This shows that the augmented reality book model is effective as an educational medium in improving teachers' dental health care attitudes. When observed from

the answers to the questionnaire, most of the teachers have been supportive such as the teacher has accompanied the child to brush their teeth, the teacher supports brushing their teeth at least 2 times a day, using toothpaste containing flour and so on. The difference in increasing teacher knowledge is 7.21,

Children's dental and oral health is generally found to be in poor condition with the presence of plaque and other deposits on the tooth surface. Plaque accumulation will cause an increase in carbohydrate fermentation by acidogenic bacteria, which will then cause the salivary pH to decrease, if the salivary pH drops to a critical threshold it will cause demineralization of enamel which will then cause caries on the teeth. One of the factors causing caries in children is the lack of knowledge about when to brush their teeth and how to brush their teeth properly[87].

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➢ *Test the action on the teacher*

Based on the results of the study showed that there was an increase in teacher actions before and after being given treatment, where before being given treatment the average value of teacher actions was 6.10 in the intervention group increased to 8.75, in the control group the average value before being given treatment was 4.45 increased to 8.60. It showsthe augmented reality book model is effective as an educational medium in improving teachers' dental health maintenance actions. When observed from the answers to the questionnaire, most of the teachers had prepared tools and materials for brushing their teeth, poured toothpaste about the size of corn kernels, rinsed their mouths with clean water before brushing their teeth and so on. The difference in the increase in teacher action was 1.91, and the difference in the increase in teacher knowledge in the control group was 1.51.

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IV. CONCLUSION

The augmented reality book model is relevant as an effort to improve dental health maintenance behavior and plaque-free scores in pre-school-aged children. The augmented reality book model as an effective educational medium increases knowledge of dental health care for mothers with a p-value (0.001) and knowledge of dental health care for teachers with a p-value (0.001) compared to the control group. The augmented reality book model as an effective educational medium increases attitudes towards dental health maintenance in mothers with a p-value (0.002), and attitudes towards dental health care in teachers with a p-value (0.001) compared to the control group. The augmented reality book model as an effective educational medium increases dental health maintenance actions for mothers with a p-value (0.001), and dental health maintenance actions for teachers with a p-value (0.002) compared to the control group. The augmented reality book model is effective as an educational medium in increasing teachers' dental health maintenance knowledge. The difference in increasing teacher knowledge was 1.64, and the difference in increasing teacher knowledge in the control group was 1.19. The augmented reality book model is effective as an educational medium in improving teachers' dental health care attitudes. The difference in increasing teacher knowledge was 7.21, and the difference in increasing teacher knowledge in the control group was 5.29. The augmented reality book model is effective as an educational medium in improving teachers' dental health maintenance actions. The difference in the increase in teacher action was 1.91, and the difference in the increase in teacher knowledge in the control group was 1.51. The augmented reality book model as an effective educational medium increases knowledge of dental health maintenance in pre-school-age children with a p-value (0.001) compared to the control group. The augmented reality book model as an effective educational medium improves dental health care attitudes in pre-school-age children with a p-value (0.002) compared to the control group. The augmented reality book model as an effective educational medium increases dental health maintenance actions in pre-school aged children with a p-value (0.001) compared to the control group. The augmented reality book model as an effective educational medium reduces plaque scores in children compared to the control groupwith a p-value (0.001).

REFERENCES

[1.] Marludia MA. Explosion Teeth Box Promotion Media Model Against Changes in Teeth Brushing Behavior in School Students. J Appl Bacteriol. 2021;31(4):xi-xii. doi:10.1111/j.1365-2672.1968.tb00384.x

[2.] Ratna D, Djamil M, Wiyatini T, Supriyana, Sunarjo L. SMART DENTAL ALARM AS AN EDUCATIONAL MEDIA TO IMPROVE KNOWLEDGE AND ATTITUDE OF BRUSHING TEETH IN EARLY CHILDHOOD. J Appl Meas. 2020;6(4):1-20.

[3.] Widyastuti N, Fatmasari D, Djamil M. EFEKTIFITAS "BUKU FLANEL GIGI HENI" PADA PENINGKATAN PERAWATAN KESEHATAN GIGI DI ANTARA PROGRAM PENDIDIKAN ANAK USIA DINI Nugraheni. J Appl Meas. 2020;6(4):1-20.

[4.] James SL, Abate D, Abate KH, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 Diseases and Injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392(10159):1789-1858. doi:10.1016/S0140-6736(18)32279-7

[5.] Angelica C, Sembiring LS, Suwindere W. Pengaruh tingkat pendidikan tinggi dan perilaku ibu terhadap indeks def - t pada anak usia 4 – 5 tahun. Padjadjaran J Dent Res Student. 2019;3(1):20-25.

[6.] Badan Penelitian dan Pengembangan Kesehatan. Laporan_Nasional_RKD2018_FINAL.pdf. Badan Penelit dan Pengemb Kesehat. Published online 2018:198. http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf

[7.] Rusmiati, Rosmawati, Sari RD. Pengetahuan Ibu Tentang Pemeliharaan Kesehatan Gigi Dan Mulut Terhadap Karies Rampan Murid Taman Kanak-Kanak (Tk) Di Kecamatan Kota Baru Jambi Tahun 2017. 2017;2(2):81-85.

[8.] Sutomo B, Hanifah TU, Salikun, Ediyono S. Faktor-faktor Penyebab Rampan Karies pada Siswa TK Budi Utami di Daerah Pesisir Pantai Desa Berahan Wetan Kecamatan Wedung Kabupaten Demak. J Kesehat Gigi. 2018;05(2):22-31.

[9.] Eke PI, Page RC, Wei L, Thornton-Evans G, Genco RJ. Update of the Case Definitions for Population-Based Surveillance of Periodontitis. Physiol Behav. 2018;176(5):139-148. doi:10.1902/jop.2012.110664.Update

[10.] Sukarsih, Silfia A, Febrianti S. Hubungan Pengetahuan Ibu tentang Pemeliharaan Kesehatan Gigi dengan Status Karies pada Anak TK AL-HIKMAH Kota Jambi tahun 2018. J Bahan Kesehat Masy. 2018;Vol 2 No 2(2):131-138.

[11.] Purnama T, Rasipin R, Santoso B. Pengaruh Pelatihan Tedi's Behavior Change Model pada Guru dan Orang Tua terhadap Keterampilan Menggosok Gigi Anak Prasekolah. Qual J Kesehat. 2019;13(2):75-81. doi:10.36082/qjk.v13i2.80

[12.] Badan Penelitian dan Pengembangan Kesehatan. Riskesdas 2018. Badan Penelit dan Pengemb Kesehat. Published online 2018:198.

[13.] RI badan penelitian dan pengembangan kesehatan kementerian kesehatan. rencana aksi program 2020-2024. Published online 2020.

[14.] Ningsih LS, Santoso B, Wiyatini T, Fatmasari D, Rahman WA. Smart Dental Card Game Model as An Effort to Improve Behavior of Health Care For Elementary School Students. Int J Nurs Heal Serv. 2020;3(5):608-614. doi:10.35654/ijnhs.v3i5.345

[15.] Santoso B, Susanto E, Widyawati MN, Rasipin, Rahman WA, Rajiani I. Revitalizing school dental health effort through "Model 222" as a strategy to achieve caries free Indonesia 2030. Syst Rev Pharm. 2020;11(2):658-662. doi:10.5530/srp.2020.2.94

[16.] Abdullah N. Hubungan Status Kesehatan Gigi Dan Mulut Anak Sekolah Dengan Pelaksanaan UKSG (Usaha Kesehatan Gigi Sekolah) Di Sekolah Dasar dan Sederajat Se Kota Makassar. J Media Kesehat Gigi. 2018;17(1):32-33.

[17.] Santoso B, Sulistiyowati I, Mustofa Y. 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. J Kesehat Gigi. 2020;7(1):58-67. doi:10.31983/jkg.v7i1.6529

[18.] Muhammad Saleh, Syamsuddin AB, Munadirah NA dan N. Media Implementasi Riset Kesehatan Pelatihan Guru Sebagai Upaya Peningkatan Perilaku Kebersihan Gigi Dan Mulut di SD Negeri Mamajang I Kota Makassar (Muhammad Saleh, Syamsuddin AB, Munadirah, Nurwiyana Abdullah dan Nurhaeni). 2018;1(1):19-21.

[19.] Afiati R, Duarsa P, Ramadhani K, Diana S. HUBUNGAN PERILAKU IBU TENTANG PEMELIHARAAN KESEHATAN GIGI DAN MULUT TERHADAP STATUS KARIES GIGI ANAK Tinjauan Berdasarkan Pengetahuan, Tingkat Pendidikan, dan Status Sosial di TK ABA 1 Banjarmasin Kajian. Dentino J Kedokt Gigi. 2017;II(1):56-62.

[20.] Santoso B, Eko Ningtyas EA, Fatmasari D. IMPROVING ELDERLY'S DENTAL HYGIENE THROUGH NURSING HOME STAFF'S DENTAL HEALTH EDUCATION AT THE NURSING HOME. J Kesehat Masy. 2017;12(2):189-198. doi:10.15294/kemas.v12i2.8461

[21.] Razi P, Surayah, Widia. Promosi Kesehatan Dengan Pola Asah, Asih Dan Asuh Dalam Meningkatkan Kemandirian Menyikat Gigi Pada Anak Usia Dini Di Tk Khalifah 2 Jambi Tahun 2019. J Salam Sehat Masy. 2020;1(2):7-12.

[22.] Khasanah NN, Susanto H, Rahayu W. Gambaran Kesehatan Gigi Dan Mulut Serta Perilaku Menggosok the Describe Dental and Oral Health Toward Brushing Teeth Practice Among School Age Children. J Imiah Permas J Ilm STIKES Kendal. 2019;9(4):327-334.

[23.] Hamidah LN, Sarwo IE, Hendro Pranowo. Gambaran pengetahuan dan perilaku tentang

menggosok gigi pada anak tahun 2020. J Ilm Keperawatan Gigi. 2021;2(1):108-114. ejurnal.poltekkestasikmalaya.ac.id

[24.] Lanny Sunarjo, Salikun PWN. Faktor penyebab tingginya angka karies gigi tetap pada siswa sd negeri 02 banjarsari kecamatan talun kabupaten pekalongan. ARSA/actual Res Sci Acad. 2016;1:22-28. Lanny Sunarjo,et al./Journal ARSA (Actual Research Science Academic) 2016 November; 1(1): 22-28

[25.] Sari RMM, Priatna N. Model-Model Pembelajaran di Era Revolusi Industri 4.0 (E-Learning, M-Learning, AR-Learning dan VR-Learning). J Ilm Fak Kegur dan ilmu Pendidik. 2020;6(1):107-115.

[26.] Subekti A, Sutomo B, Santoso B, et al. Penerapan Media Software Interaktif Sebagai Media Edukasi Dalam Perubahan Tingkat Pengetahuan Dan Perilaku Kesehatan Gigi Serta Tingkat Kebersihan Gigi. Link. 2018;14(1):31. doi:10.31983/link.v14i1.3279

[27.] Subekti A, Siregar IH, EN EA, Sunarjo L. WISATA KLINIK GIGI (DENTAL EDU TOUR) SEBAGAI MEDIA EDUKASI KESEHATAN GIGI DAN MULUT BAGI ANAK TK ABA KECAMATAN BANYUMANIK SEMARANG. Published online 2021:173-180.

[28.] Muhtar S, Hatta I, Wardani IK, et al. Hubungan Tingkat Pengetahuan Ibu Tentang Kesehatan Gigi Dengan Tingkat Kebersihan Gigi Dan Mulut Pada Anak Di Kabupaten Barito Kuala. Jur Ked Gigi). 2020;1(1):16-20. https://ppjp.ulm.ac.id/journals/index.php/dnt/article/view/2243

[29.] Putrawangsa S, Hasanah U. Integrasi Teknologi Digital Dalam Pembelajaran Di Era Industri 4.0 Kajian dari Perspektif Pembelajaran Matematika. J Pemikir dan Penelit Pendidik. 2018;16(1):42-54.

[30.] Suar haifa pasca nadira. ADAPTASI REVOLUSI INDUSTRI 4.0 PADA PELAYANAN KESEHATAN MELALUI TELEMEDICINE DI ERA PANDEMI COVID-19. 2022;4(1):1-23.

[31.] Yanto BF, Werdiningsih I, Purwanti E. Aplikasi Sistem Pakar Diagnosa Penyakit Pada Anak Bawah Lima Tahun Menggunakan Metode Forward Chaining. J Inf Syst Eng Bus Intell. 2017;3(1):61. doi:10.20473/jisebi.3.1.61-67

[32.] Hsieh MC, Lee JJ. Preliminary Study of VR and AR Applications in Medical and Healthcare Education. J Nurs Heal Stud. 2018;03(01):1-5. doi:10.21767/2574-2825.100030

[33.] Suciliyana Y, Rahman LOA. Augmented Reality Sebagai Media Pendidikan Kesehatan Untuk Anak Usia Sekolah. J Surya Muda. 2020;2(1):39-53. doi:10.38102/jsm.v2i1.51

[34.] Mustaqim I, Kurniawan N. Pengembangan Media Pembelajaran Berbasis Augmented Reality. Lentera Pendidik J Ilmu Tarb dan Kegur. 2018;21(1):59-72. doi:10.24252/lp.2018v21n1i6

[35.] Riskiono SD, Susanto T, Kristianto K. Augmented reality sebagai Media Pembelajaran Hewan Purbakala. Krea-TIF. 2020;8(1):8.

doi:10.32832/kreatif.v8i1.3369

[36.] Armia A, Ardian Z. Perancangan Augmented Reality Sebagai Media Promosi Gedung Kampus Universitas Ubudiyah Indonesia. J Informatics Comput Sci. 2021;7(1):10-16. http://jurnal.uui.ac.id/index.php/jics/article/view/1331

[37.] Aghnaita A. Perkembangan Fisik-Motorik Anak 4-5 Tahun Pada Permendikbud no. 137 Tahun 2014 (Kajian Konsep Perkembangan Anak). Al-Athfal J Pendidik Anak. 2017;3(2):219-234. doi:10.14421/al-athfal.2017.32-09

[38.] Oktaviyani RD, Suri OI. Pengaruh Terapi Bermain Puzzle Terhadap Perkembangan Kognitif Anak Usia Prasekolah. J Kesehat. 2019;10(2):112. doi:10.35730/jk.v10i2.406

[39.] Suratri MAL, Jovina TA, Tjahja I. Pengaruh (pH) Saliva terhadap Terjadinya Karies Gigi pada Anak Usia Prasekolah. Bul Penelit Kesehat. 2017;45(4):241-248. doi:10.22435/bpk.v45i4.6247.241-248

[40.] Rizkyani F, Adriany V, Syaodih E. Kemandirian Anak Usia Dini Menurut Pandangan Guru Dan Orang Tua. Edukid. 2019;16(2):121-129. doi:10.17509/edukid.v16i2.19805

[41.] Sari SY, Nugroho AD, Indrawati I. Eksistensi keluarga dalam pembentukan karakter anak usia dini. Tumbuh Kembang Kaji Teor dan Pembelajaran PAUD. 2019;6(2):146-154.

[42.] Hidayati S, Rahayu Cahyanti Kunafah S, Chairanna Mahirawatie I, Keperawatan Gigi J, Kesehatan Kemenkes Surabaya P. Pengetahuan Tentang Karies Gigi Pada Siswa Kelas V Sdn Pakal 1 Surabaya Tahun 2020. E-Indonesian J Helath Med. 2021;1(3):2774-5244.

[43.] Woodward M, Rugg-Gunn AJ. Chapter 8: Milk, yoghurts and dental caries. Monogr Oral Sci. 2019;28:77-90. doi:10.1159/000455374

[44.] Abdelkader HS, Alayafi AA, Ahmed HE, Osail RA Bin. The Antibacterial Activity of Nanosilver Coupled Edible Plant Extracts Against Streptococcus mutans, the Cause of Dental Caries. J Pharm Res Int. 2021;(December):167-186. doi:10.9734/jpri/2021/v33i34b31859

[45.] Saidjanovna RD. Modern Concepts of the Causes of Development , Prevention and Principles of Treatment of. 2021;08(01):1477-1482.

[46.] Mathur VP, Dhillon JK. Dental Caries: A Disease Which Needs Attention. Indian J Pediatr. 2018;85(3):202-206. doi:10.1007/s12098-017-2381-6

[47.] Bicak DA. A Current Approach to Halitosis and Oral Malodor- A Mini Review. Open Dent J. 2018;12(1):322-330. doi:10.2174/1874210601812010322

[48.] Karbalaei M, Keikha M, Kobyliak NM, Khatib Zadeh Z, Yousefi B, Eslami M. Alleviation of halitosis by use of probiotics and their protective mechanisms in the oral cavity. New Microbes New Infect. 2021;42:1-8. doi:10.1016/j.nmni.2021.100887

[49.] Könönen E, Gursoy M, Gursoy UK. Periodontitis: A multifaceted disease of tooth-supporting tissues. J Clin Med. 2019;8(8). doi:10.3390/jcm8081135

[50.] Dharmawati IGAA, Mahadewa TGB, Widyadharma IPE. Antibacterial activity of lumbricus rubellus earthworm extract against porphyromonas gingivalis as the bacterial cause of periodontitis. Open Access Maced J Med Sci. 2019;7(6):1032-1036. doi:10.3889/oamjms.2019.222

[51.] Sälzer S, Graetz C, Dörfer CE, Slot DE, Van der Weijden FA. Contemporary practices for mechanical oral hygiene to prevent periodontal disease. Periodontol 2000. 2020;84(1):35-44. doi:10.1111/prd.12332

[52.] Miao M, Peng M, Xing Z, Liu D. Effect of Shuangjinlian mixture on oral ulcer model in rat. Saudi J Biol Sci. 2019;26(4):790-794. doi:10.1016/j.sjbs.2019.02.005

[53.] Sharma D, R G. A Comprehensive Review on Aphthous Stomatitis, its Types, Management and Treatment Available. J Dev Drugs. 2018;7(2):1-8. doi:10.4172/2329-6631.1000189

[54.] Batra M, Gupta S, Erbas B. Oral health beliefs, attitudes, and practices of south Asian migrants: A systematic review. Int J Environ Res Public Health. 2019;16(11). doi:10.3390/ijerph16111952

[55.] Nuratni NK, Wirata IN, Arini NW, Artawa IMB, Raiyanti IGA, Adihacita NP. Dental Health Care Influence on Dental Hygiene of Elementary School Children. J Heal Med Sci. 2021;4(3). doi:10.31014/aior.1994.04.03.182

[56.] Zulfikri, Huda ZI. The relation between oral hygiene index and dental caries index in students of SDN 03 Pakan Kurai, Guguk Panjang, Bukittinggi. J Kesehat Gigi. 2017;4(1):55. doi:10.31983/jkg.v4i1.2716

[57.] titik sugiatri Y dyah puspita santik. Kejadian Periodontitis Di Kabupaten Magelang. Higeia J Public Heal Res Dev. 2019;2(2):331-341.

[58.] Arviani D. Pengaruh Konten Animasi Dalam Upaya Promotif Kesehatan Gigi dan Mulut Terhadap Tingkat Pengetahuan Anak Usia 6 sampai 8 Tahun di SDN 3 Palembang. Univ Sriwij. Published online 2021.

[59.] Cahyaningrum AN. Hubungan Perilaku Ibu Terhadap Kejadian Karies Gigi Pada Balita di Paud Pyra Sentosa. J Berk Epidemiol. 2017;5(2):143. doi:10.20473/jbe.v5i2.2017.142-151

[60.] Nurwanti W, Santoso B, Fatmasari D, Djamil M. WIDI ' S PUZZLE DEVELOPMENT TOWARDS IMPROVEMENT IN ORAL HYGIENE BEHAVIOUR OF SPECIAL SCHOOL TEACHER. Published online 2019.

[61.] Nurrita T. Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. J Phys Conf Ser. 2018;1321(2):171-187. doi:10.1088/1742-6596/1321/2/022099

[62.] Novita L, Sukmanasa E, Yudistira Pratama M. Penggunaan Media Pembelajaran Video terhadap Hasil Belajar Siswa SD. © 2019-Indonesian J Prim Educ. 2019;3(2):64-72. https://repository.unpak.ac.id/tukangna/repo/file/file s-20200110015955.pdf

[63.] Karlina H. Penggunaan Media Audio-Visual untuk Meningkatkan Kemampuan Menulis Naskah Drama. Literasi. 2017;1(1):28-35.

[64.] Aditama PW, Adnyana INW, Ariningsih KA. Augmented Reality dalam Multimedia Pembelajaran. Pros Semin Nas Desain dan Arsit. 2019;2(July):176-182.

[65.] Ramadhan AF, Putra AD, Surahman A. Aplikasi Pengenalan Perangkat Keras Komputer Berbasis Android Menggunakan Augmented Reality (Ar). J Teknol dan Sist Inf. 2021;2(2):24-31.

[66.] Amirullah. Aplikasi Augmented Reality Sebagai Media Edukasi Protokol Kesehatan dan Informasi Penyebaran COVID-19 di Indonesia. J Infomedia Tek Inform Multimed Jar. 2021;6(2):63-70.

[67.] Firmansyah MA, Kartikasari D. literature review: gambaran pengetahuan sikap dan perilaku masyarakat tentang COVID-19. Semin Kesehat Nas. Published online 2021:1516-1523.

[68.] Sutomo B, Santosa B, Maula NA. Pengaruh Perilaku Orang Tua Terhadap Status Kebersihan Gigi Anak Di Sdn 03 Karangjati. J Kesehat Gigi. 2017;04(2):21-26.

[69.] Indanah, Yulisetyaningrum. Perkembangan Sosial Emosional Anak Prasekolah. J Ilmu Keperawatan dan Kebidanan. 2019;10(1):221-228.

[70.] Sinaga TR, Damanik E, Etty CR, Sihaloho S. hubungan peran orang tua dengan kejadian karies gigi pada anak pra sekolah di taman kanak-kanak (TK) nurul kamka, kecamatan binjai timur. Published online 2020:152-159.

[71.] Pakpahan M, Siregar D, Susilawaty A, et al. Promosi Kesehatan & Prilaku Kesehatan.; 2021.

[72.] Triswari D, Dian Pertiwi A. Pengaruh Kebiasaan Menyikat Gigi Sebelum Tidur Malam Terhadap Skor Indeks Plak dan pH Saliva. Insisiva Dent J Maj Kedokt Gigi Insisiva. 2017;6(2):1-8. doi:10.18196/di.6282

[73.] Sugiyono. Metode Penelitian Kuantitatif, Kualitatfi, Dan R&D. CV Alfabeta; 2017.

[74.] Nurlila RU, Jumarddin LF, Meliana. Pengaruh Pendidikan Kesehatan Terhadap Pengetahuan Tentang Kesehatan Gigi Pada Siswa Di SD Kartika XX-10 Kota Kendari Tahun 2015. J Al-Ta'dib. 2016;9(1):94-119. http://edukasional.com/index.php/ARSA/article/view/104

[75.] Putri VH, Sitoayu L, Ronitawati P. Pengaruh media AR Book terhadap peningkatan pengetahuan dan sikap gizi seimbang pada anak usia sekolah. AcTion Aceh Nutr J. 2021;6(2):118. doi:10.30867/action.v6i2.380

[76.] RAHMADANI DN. PENGGUNAAN TEKNOLOGI AUGMENTED REALITY SEBAGAI MEDIA PEMBELAJARAN DALAM MENINGKATKAN KESEHATAN GIGI DAN MULUT PADA ANAK. Published online 2021. https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf

[77.] Hidayat T. Penerapan Teknologi Augmented Reality

Sebagai Model Media Edukasi Kesehatan Gigi Bagi Anak. Creat Inf Technol J. 2015;2(1):77. doi:10.24076/citec.2014v2i1.39

[78.] Mustafa H. Perilaku Manusia Dalam Perspektif Psikologi Sosial. J Adm Bisnis. Published online 2011. doi:10.1159/000074314

[79.] Mustaqim I. PEMANFAATAN AUGMENTED REALITY SEBAGAI MEDIA PEMBELAJARAN. J Pendidkan Teknol dan Kejuru. 2016;13(2):174. doi:10.1109/SIBIRCON.2010.5555154

[80.] Dewi DAS, Putra IKGD, Bayupati IPA. Aplikasi Augmented Reality Jurusan Teknologi Informasi Universitas Udayana (AR-TI). J Ilm Merpati (Menara Penelit Akad Teknol Informasi). 2017;5(1):9. doi:10.24843/jim.2017.v05.i01.p02

[81.] Joefrie YY, Anshori Y. Teknologi Augmented Reality. Maj Ilm Mektek. Published online 2016. https://www.medigraphic.com/pdfs/educacion/cem-2017/cem172y.pdf

[82.] Arsyad. PENGARUH PENYULUHAN TERHADAP PENGETAHUAN PADA MURID KELAS IV DAN V SD. Media Kesehat Gigi. 2018;17(1):61-72. http://dx.doi.org/10.1186/s13662-017-1121-6%0Ahttps://doi.org/10.1007/s41980-018-0101-2%0Ahttps://doi.org/10.1016/j.cnsns.2018.04.019%0Ahttps://doi.org/10.1016/j.cam.2017.10.014%0Ahttp://dx.doi.org/10.1016/j.apm.2011.07.041%0Ahttp://arxiv.org/abs/1502.020

[83.] Hermawan R, Warastuti W, Kasianah. Faktor-Faktor Yang Mempengaruhi Kesehatan Gigi Dan Mulut Anak Usia Prasekolah Di Pos Paud Perlita Vinolia Kelurahan Mojolangu. J Keperawatan. 2016;6(2):132-141.

[84.] Purnomo H. Peran Orang Tua dalam Optimalisasi Tumbuh Kembang Anak untuk Membangun Karakter Anak Usia Dini. Pros Semin Nas Parent. Published online 2013:34-47.

[85.] Herviana Muarifah Ngewa. Peran Orang Tua Dalam Pengasuhan Anak. Published online 2019:96-115.

[86.] Ratih IADK, Yudita WH. Hubungan Tingkat Pengetahuan Tentang Cara Memelihara Kesehatan Gigi dan Mulut dengan Ketersediaan Alat Menyikat Gigi pada Narapidana Kelas IIB Rutan Gianyar Tahun 2018. J Kesehat Gigi. 2019;6(2):23-26.

[87.] Ana Riolina. Peran Guru dalam Meningkatkan Kesehatan Gigi dan Mulut Siswa di Sekolah Dasar. J Ilmu Kedokt Gigi. 2017;1(2):51-54.

[88.] Wijaya KAK, Mahirawatie IC, Marjianto A. Peran Guru Pada Kegiatan UKGS Terhadap Karies Gigi Anak SD. J Ilm Keperawatan Gigi. 2022;3(1):39-58. http://ejurnal.poltekkestasikmalaya.ac.id/index.php/jikg/article/view/861