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## **Development of Magic Paper Models to Improve Dental Health Behavior among Children with Elementary School Level**

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**Abstract.** The prevention of dental diseases and mouth has been done with many preventive and curative promotive efforts. Still, the effort has not succeeded in increasing the value of dental health behavior. It is seen from the percentage of caries of children aged 9-11 years by 44%. Elementary school children's media can help understand, maintain, and prevent dental and oral diseases. The media was created in an exciting form so that the child was able to learn while playing. Generating magic paper models produced by the design of relevant/worthy builds as health promotion media for children, and its application can improve elementary school children's dental health behavior better. A research and Development (R&D) research design was applied in this study and model testing using quasi-experiment design pre-test and post-test with non-equivalent control group design. Magic paper models are relevant/feasible as a media for health promotion for elementary school children. The 21 days program was useful for an increase in knowledge (P=0.001), attitude (P=0.001), and action (P=0.001) on health promotion for elementary school children. Media Magic paper models created by the design of the relevant/feasible as health promoton media for children and its application can better improve dental health elementary children's behavior.

**Keywords:** magic paper models, dental health, attitudes, actions.



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## INTRODUCTION

Dental caries was health problems of the teeth and mouth. The prevalence of caries increased both globally and became a priority in Indonesia, especially school-age children. Dental caries is a challenging tooth tissue disease characterized by the breakdown of enamel and dentin. It is caused by the bacteria's metabolic activity in the plaque that causes demineralization. Dental caries could improve severe periodontal infections without appropriate treatment (1,2).

The Basic Health Research (RISKESDAS) in Indonesia showed that dental and oral health problems were 43.4% in 2007. The number increased in 2013 to be 53.2%, and the prevalence of caries amounted to 57.6% in 2018. Accumulation of dental caries in Indonesia reaches 72.1% and DMF-T index of 4.85 (high) (3). In addition, the prevalence of children with caries based on age characteristics at 5-9 years of 21.6%, age 10-14 year amounted to 20.6% and amounting to 43.4% age 15 years and above who have caries active and have not been dealt. One cause of the high prevalence of dental caries was the less maintenance of dental health (4-6).

The low maintenance behavior of dental and oral hygiene can cause problems with dental and oral health. Health behavior includes knowledge, attitudes, and actions relating to healthy and diseased concepts and prevention efforts. Knowledge, attitudes, and actions are factors that can affect one's awareness of maintaining dental and oral health (7).

A study expressed a significant relationship between dental and oral health knowledge levels with dental caries incidence. Knowledge and attitudes are interconnected in the formation of the ability to perform specific actions. Less understanding of dental hygiene and mouth is one of the causes of children ignoring dental and oral health problems. Factors that affect the lack of knowledge, among others, because the source of information is lacking, so the importance of education dental health and oral (8,9).

The education of dental and oral health would be useful for elementary school children when integrated with children's school activities. Those activities were often conducted during schooling activities such as reading stories, playing a game, or learning while singing. The activities performed can be given according to the ability of the child. Looking out from the child's enthusiasm, the child is pleased to find out what the child has not known before in the way the child learns about it, and the child loves to learn while playing to understand better what the children have not known before (10).

Learning while playing is one way to improve the children's learning behavior since the material was delivered by the exciting method and according to the child-favors and undoubtedly appropriate for elementary school children. Therefore it is needed media that can help children in dental health knowledge (11,12).

One approach to providing dental health education to children's behavior through media suitable for children's interest is by using media magic paper models packaged into an academic education done by storytelling and play. The learning while storytelling and playing are for new behavioral changes and reduce unwanted behavior to learn and motivate him. This theory has been put forward since 1969 and is still in use by many practitioners (13). The strategy of Health behavior management among children by storytelling using media magic paper models was the basis to start treatment. It could also develop children's attitudes who want to conduct health care for their mouth and healthy teeth. Therefore, good health and mouth could be achieved (14).

Magic paper models have folded paper folds with images that have been designed according to the storyline that will be given to the child. The storyline provides information about the benefits of maintaining dental and oral health and consequences when the child ignores dental and oral health. Thereby, children could understand the flow of dental health education that can improve the child's dental health and mouth (15).

## RESEARCH METHODS

This study applied the Research and Development (R&D) strategy to develop the media magic, paper models. Five steps, as follows: 1) information collection, 2) model building design, 3) expert validation and revision, 4) model trials, and 5) results from the model (16). A quasi-experimental, pre-test, and post-test study design with a non-equivalent control group was conducted to examine the effect of the model on dental and oral health.

Fifty elementary school children were selected by using purposive sampling. We divided into two groups: 25 samples in the interventions group and 25 samples for the control group. The knowledge, attitudes, and actions are measured using a questionnaire. The PTI value was obtained from the DMF-t value that exists in children. Before analyzing the data, the normality test was used by using the Shapiro-Wilk.

The repeated measure ANOVA test was applied in this study to test the intervention's effect on health outcomes.

## MODEL DEVELOPMENT PROCESS

### A. Information Collection

The results of information collection obtained the conclusion that the promotion media dental and oral health can be increased, among others: 1) Media that is provided in the form of innovative media and can be played by children, 2) support from the health office and local puskesmas for health promotion, 3) need help from all school citizens, 4) the existence of collaborative dental therapist and mouth and school teachers so that the creation of good cooperation to provide innovation to elementary school children and 5) healthcare professionals make schedules to provide education Service.

### B. Model Design

Development of magic paper models compiled into a health promotion media to improve the knowledge, attitudes, and actions of elementary school children, made into an innovative media, creative and facilitate elementary school children in the learning process. Implementing the model could improve knowledge among elementary school children regarding dental and oral health management and influence attitudes and actions.

### C. Expert Validation

Table 1 described the expert of validity for a model. The results show a total value of 86.67, which is indicated that the model was very decent for implementing among children at the elementary school level.

Table 1. Expert Validation Statistics Test

The validity of the model					
	n	F(%)	Total	Category	p-value
Relevant	3	100	86.67	Applicable	0.018
Not relevant	0	0			

\*interclass correlation coefficient

### D. Test Model

Table 2 described model testing. The normality results showed that the knowledge, attitudes, actions, and PTI of both the intervention and control groups were not normal distribution with the P-value value < 0.05. Therefore, a non-parametric test would be applied in this study

Table 2. Testing of normality data among the intervention group and control group

Testing of normality data			
No	Variable	p-value	
		Intervention (N=25)	Control (N=25)
1	Pre-Test knowledge	0.001	0.040
2	Knowledge Post-Test 1	0.001	0.039
3	Knowledge Post-Test 2	0.001	0.015
4	Knowledge Post-Test 3	0.001	0.001
5	Knowledge Post-Test 4	0.001	0.033
6	Knowledge Post-Test 5	0.001	0.027
7	Pre-Test attitude	0.307	0.031
8	Attitude Post-Test 1	0.056	0.070
9	Attitude Post-Test 2	0.010	0.062
10	Attitude Post-Test 3	0.010	0.017
11	Attitude Post-Test 4	0.003	0.014
12	Attitude Post-Test 5	0.001	0.023
13	Pre-Test action	0.002	0.122
14	Post-Test Action 1	0.006	0.040
15	Post-Test Action 2	0.008	0.011
16	Post-Test Action 3	0.016	0.001
17	Post-Test Action 4	0.001	0.114
18	Post-Test Action 5	0.001	0.017

*\*Shapiro-Wilk.*

#### E. Final Model

The final model of the study was the Magic paper model of dental hygiene and learning. The model was implemented through gamification based educational methods. The model appropriate for children with Grade 5 in elementary school. Media Magic paper models differ from other media since they have varieties of shapes. Besides that, this model also was appropriate for media playing among children.

## RESULTS

Table 3 described the effect of the model on knowledge, attitude, and action. The results showed that the p-value of knowledge in the intervention group 0.001 ( $p < 0.05$ ), and the control group was 0.039 ( $P < 0.05$ ). The attitude of the intervention group was 0.001 ( $p < 0.05$ ), and the control group is 0.054 ( $P < 0.05$ ). While the action in the intervention group showed a p-value was 0.001 ( $p < 0.05$ ), and the control group was 0.044 ( $P < 0.05$ ). It was indicated that the magic paper models were effectively improved knowledge, attitudes, and action before and after implementation among the intervention group compared to the control group.

Table 3. The effect of the model on knowledge, attitude, and action

Groups	Mean ± SD Pre-test	Mean ± SD Post-test 1	Mean ± SD Post-test 2	Mean ± SD Post-test 3	Mean ± SD Post-test 4	Mean ± SD Post-test 5	<i>p</i> - <i>value</i>
<b>Knowledge</b>							
Intervention	3.44±0.683	5.32±0.748	7.36±0.638	8.24±0.723	9.12±0.726	9.72±0.436	0.001
Control	5.16±1.028	5.08±1.038	5.04±1.207	5.08±0.954	4.80±1.258	4.80±1.080	0.039
<b>Attitude</b>							
Intervention	25.48±2.434	31.80±2.345	38.04±1.428	43.24±1.615	46.40±1.080	49.12±1.013	0.001
Control	23.04±1.207	22.16±1.179	22.36±1.319	22.28±1.458	22.52±1.262	22.64±1.114	0.054
<b>Action</b>							
Intervention	4.36±1.036	5.60±0.866	6.60±1.000	7.24±1.091	8.20±0.866	8.68±0.557	0.001
Control	5.32±1.145	5.24±1.091	5.16±1.248	5.16±0.943	4.96±1.338	4.88±1.080	0.044

\**Friedman*

## DISCUSSION

Based on the study results, the study concluded that to form the independence of elementary children in dental health required learning media that can involve the child in conducting it. According to Novitasari (2017) opinion, the delivery of health materials through health education programs with an exciting education is a need that is continuously needed by children to develop and A suitable (17). The model for this is the media magic, paper models.

The results of the member's validity show a total value was 86.67. It was categorized as very decent, which means the model magic paper models are relevant/worthy of being used as a promotional media for dental health in grade 5 children element school. Expert validation was done to develop models/products to produce models/products that are beneficial in improving the quality of education. According to research Richey (2012), necessary equipment in development research is experts (expertise) to be used as a determination of the theory and validity of the model (18). Therefore, development research will be carried out well if it involves enough participants.

Raising awareness was required to effort both from the parents and the environment. School is an organized community, so easy to reach in the framework of UKS. School children are susceptible groups to accept change or renewal because the group of school children is in growth and development. At this level, the child is sensitive to the stimulus, so it is easy to be guided, directed, and implanted good habits, including changing lousy behavior to maintain teeth and mouth (19).

Dental and oral health education interventions can be given to elementary school children, but in the process required a media education and health promotion that can help elementary school children deliver dental and oral health material. According to research Afif Hamdalah (2013) gives practical lessons not enough to provide information, but will be exciting if the learners are given supporting media for learning to learn not quickly saturated (20).

Magic paper models used as a promotional media new findings because it has different advantages with other media: magic paper models have a variety of shapes that can be played by children in which each form has an image. It could be explained to the children, and they described the story using the language they understand. Besides the child able to understand the dental health material, children can also develop their imagination in storytelling. The child can even set the motor very well because it plays various forms in magic paper models (15).

Magic paper models are subject to students by stage: education, demonstration, simulation, and evaluation. This stage of instruction, demonstration, and evaluation is given by researchers assisted by the nearest health care officers and the UKS teacher. The simulation would be practiced with the imagination and language according to their ability.

The practical test result of the variable data in pairs shows the value of the child's knowledge Friedman test in the intervention group, indicating that the P-value is  $< 0.05$ . This means that media magic paper models and control groups with a P-value value are  $< 0.05$  meaning the Illustrated storybook is useful for enhancing the child's knowledge. The value of knowledge in the intervention group increased because, during 21 days, respondents were given counseling by the Gamification method using media magic paper models. The process of self-reliance and child awareness was developed by counseling method using media magic paper models. The next day, the child will play live media magic paper models and tell their language, respectively (21).

Test results in paired variable data in pairs showed that the value of the primary schoolchild Test Friedman in the intervention group showed that the P-value  $< 0.05$ . It was indicated that media Magic paper models are sufficient to improve the attitude of elementary school children. Whereas in the control group, the p-value of attitude was  $>0.05$  means the media of the illustrated storybook is ineffective in improving elementary school's attitude toward children's attitudes. Health promotion using new media is a more exciting ability to change children's attitudes than the media commonly used in health promotion and counseling. The success of the promotion of health promotion media plays a crucial role. It can be interpreted as a tool that facilitates elementary school children's communication and disseminates information (22).

The practical test result of the variable data in pairs shows the value of the primary school child action test in the intervention group was p-value  $< 0.05$  and the control group was p-value  $< 0.05$ . It was indicated that storybook improved action among children. It was proven because new media in health promotion and counseling can influence child action in the maintenance of dental and oral health and cultivate the child's independence in maintaining the health of teeth and mouth. The most important strategy for preserving teeth and mouth health is improving awareness and supporting personal action for oral health. Furthermore, dental material attractively without reducing the material's content and an essential strategy(23).

## CONCLUSION

Magic paper models were created to design the relevant/worthy build as a health promotion media for children. Its application significantly improve dental health behavior among elementary school children.

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