



Smart Dental Card Game Model on Improving Behavior of Health Care For Elementary School Students

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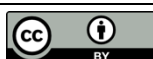
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Abstract. Correct teeth brushing behavior in elementary school children in Indonesia is 2.8%, and in Central Java 1.7%. The influencing factor is the lack of information sources, so it is essential to carry out dental and oral health education, "Smart dental card game model" provides learning to children through game methods so that the learning process is more exciting and enjoyable. To produce a gamification-based dental and oral health education model called "Smart dental card game model" to increase dental health maintenance knowledge and decrease the debris index score in elementary school children. Research and development (R&D) and model trials using quasi experiment pre-test and post-test with control sample design groups were divided into two groups, 28 intervention group students and 28 control group students. The dependent variable is the knowledge and debris index of elementary school students; the independent variable is the Smart dental card game model. The sample size was calculated by using the *slovin* formula. Data were tested using the *interclass correlation coefficient test*, *Anova*, *Wilcoxon Mann Whitney*. The smart dental card game was appropriate as a guideline in the learning process to increase elementary school students' knowledge of $2,304 \pm 9.07$ and reduce the debris index of 0.419 ± 0.68 compared to the control group flipchart media and dental phantom. Smart dental card game is useful to increase dental health maintenance knowledge of elementary school students.

Keywords: Smart Dental Card Game, Knowledge, Dental Health, Debris index.



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INTRODUCTION

Dental and oral health is part of general body health, meaning that it will affect overall health if someone experiences dental health problems. According to the World Health Organization (WHO), in 2013, 90% of school children worldwide experience dental caries. The prevalence of caries that occurs in school-age children in Indonesia reaches 89%. Riskesdas in 2018 noted the proportion of dental and mouth health problems in Indonesia by 57.6%. This proves that children's dental health both in the world and in Indonesia is still far from expectations when compared to the target in 2030 for dental caries-free and the WHO has set global oral health indicators for the year 2025, one of which is the DMF-T score for children aged 12 years no more than two from 1 (1).

The Government of Indonesia strives to improve the level of dental and mouth health of school students through the School Dental Health Effort (UKGS) program, which is integrated with School Health Business Activities (UKS) by providing promotive and preventive services, but the UKGS program has not been able to reduce the number of dental caries and periodontal disease. This is proven by Santoso's research (2015) which states that UKGS is currently not running optimally, it is seen that schools that get UKGS programs from puskesmas in the form of promotive services only reach 27% and preventive 37% (2).

The high prevalence of tooth and mouth disease is currently influenced by several factors, including maintaining dental health. Behavioral factors have an influence of 30% - 35% on health status. Bad habits also affect a low dental health degree in children. Bad habits among children, consumptive to sweet foods that are easily sticky, the practice of eating snacks outside the home, lazy to brush their teeth either after eating or the night before going to bed (3-4).

Bad habits in children are not easy to improve if oral and dental hygiene is still low. The cause of the insufficient knowledge about dental and mouth health is due to a lack of dental health education in schools. Therefore, students in schools do not know about dental health. During this time, dental health education in schools is mostly given through lecture methods, group discussions, simulations, and demonstrations. Students only listen to the material presented so that it makes students easy to forget. Variations of learning using the game method for elementary school children are needed to improve their excitement and fun (5). The strategy was used to explore learning experiences, explore, create opportunities for children to understand the situation being experienced, and exemplify return with their various opinions and concepts (6).

The researcher intends to design a gamification-based dental and oral health media in card games specifically designed based on the issue. It could convey information about dental health adapted to the characteristics of students aged 8-9 years, the Smart dental card game model, by using the stages of education, demonstration, and evaluation to increase knowledge of dental health maintenance of elementary school students.

RESEARCH PURPOSES

The general purpose is to produce gamification based on a dental and oral health education model called "Smart dental card game model" to increase dental health maintenance knowledge and decrease the debris index score in elementary school children.

RESEARCH METHODS

The method used is Research and Development (R&D). The test model uses *quasi-experimental pre and post-test with control group design*. The purpose of this study is to produce a gamification-based dental health education model that is "Smart dental card game model" to increase knowledge of dental health maintenance and decrease the debris index score in school children basis.⁷ The main steps of the research and development procedure include five stages: 1). information gathering, 2). design and build models; 3). Expert validation

validation and revision, 4). Trial product, 5). Product Production(8). The research site was conducted at an elementary school in the city of Semarang, Indonesia.

The sampling technique uses a simple random sampling technique with 28 elementary school students who meet the inclusion criteria, statistical test interclass correlation to determine the model's feasibility. Normality test using *the Shapiro Wilk* test because of the respondents' number less than 50.

Inclusion Criteria Children aged 8-9 years who are enrolled in school are willing to follow the learning process, willing to be respondents by signing an informed consent letter. **Exclusion Criteria:** Children aged < 8 years, children aged > 9 years, parents do not allow children to be sampled in the study.

Research Instruments: the instruments used in the form of a questionnaire assessment of models and media about dental and oral health, knowledge questionnaires, and check sheets of dental health care measures. The questionnaire used amounted to 10 questions about brushing teeth, the correct answer was given a score of 1, and the wrong answer was assigned a score of 0.

Debris Index Check Sheet (DI): Checks are carried out on Bukal Surface, Labial Surface, and Lingual Surface. The debris index assessment comprised of for rating such as 0=no soft debris, and no extrinsic coloring; score 1=debris covers 1/3 the tooth's surface, and extrinsic staining; score 2=debris covers between 1/3 and 2/3 of the tooth surface; and score 3= debris covered more than 2/3 of the tooth surface.

RESEARCH RESULT

A. Information Collection

The information collection results concluded that elementary school students aged 8-9 years have the habit of being happy to move, like to play, like to group, and practice directly. For increasing children's knowledge and their excitement on dental care, appropriate and stimulating learning methods and media are needed. Following the characteristics of children aged 8-9 years and involving children in their implementation, the right way is a game-based learning method.⁹ Because using a game-based learning method, the learning process will be more active, exciting, and enjoyable.¹⁰ Media suitable for realizing this is the Smart dental card game model compared to the flipchart and dental phantom media.

B. Design Products / Models

The results of the information collected are used to design the model building with the Dick and Carey theory approach as follows: The system of the *Smart Dental Card Game Model* as an effort to increase the knowledge of dental health maintenance of elementary school students.

C. Expert Validation

Table 1 Expert Validation Statistics Test

	Expert Validity		
	N	(%)	P-Value
Relevant	10	100	0.01
Irrelavant	0	0	

**intraclass correlation coefficient*

The result of expert validation shows that the p-value = 0.001, which means that the Smart dental card game is relevant and appropriate as a medium for increasing the knowledge of dental health maintenance of elementary school students.

D. Trial Product

Table 2. Normality Test

Variable	p-value	
	Intervention	Control
Knowledge (<i>pre-test</i>)	0.042	0.034
Knowledge (<i>post-test</i>)	0.000	0.000
<i>Debris Indeks</i>	0.007	0.009
<i>Debris Indeks</i>	0.012	0.023

**Shapiro-wilk test*

Table 2 showed the normality result of data. The findings showed that all the data were not normally distributed with p-value <0.005. Therefore, the process of data analysis should use the non-parametric (Wilcoxon test)

Table 3 The effectiveness of knowledge and debris index among the elementary school children for the intervention group and the control group

Group		Paired Data Test			
		N	Mean ± SD	Delta	P-Value
Knowledge					
Intervention	Pre	28	5.04±1.170	4.03	0.000
	Post	28	9.07±0.663		
Control	Pre	28	4.86±1.079	2.21	0.000
	Post	28	7.07±0.716		
Debris Indeks					
Intervention	Pre	28	2.33±0.389	1.69	0.000
	Post	28	0.64±0.256		
Control	Pre	28	2.26±0.443	1.08	0.000
	Post	28	1.18±0.377		

**Wilcoxon test*

The effectiveness of knowledge among the elementary school children in the intervention group with a p-value = 0.001 (p <0.005), meaning that the Smart Dental Card Game Model is useful as an increase in the dental knowledge health maintenance of elementary school students. Control group knowledge data with p-value = 0.001 (p <0.005) meaning that the flipchart and phantom media are also useful in increasing the dental health care knowledge of elementary school students. Based on the intervention group's delta value, a more visible increase in value from pre-test to post-test, the intervention group is 4.03 for the control group, only 2.21.

Test the effectiveness of the debris data index of elementary school children in the intervention group with a p-value of 0.001 ($p < 0.05$), meaning that the Smart Dental Card Game Model effectively decreases the debris index of elementary school students. In the control group, the p-value debris index was 0.001 ($p < 0.005$), meaning that the flipchart and phantom media effectively reduced the debris index of elementary school students. The intervention group's delta value more visible decrease in value from test to post-test, the intervention group 1.69 for the control group only 1.08.

E. Product Production

The model's result is the Smart Dental Card Game Model, which is the output of learning media development about the maintenance of dental health in elementary school children.



Picture 1. Smart Dental Card Game Model

DISCUSSION

Game-based learning methods and media effectively improved dental health care behaviors among children (11). Due to game-based learning methods, the learning process was more active, exciting, and fun.

The process of expert validation is essential to do in developing models that are useful in health promotion activities (12). Equipment needed in development research will be used to determine the theory and validity of the model. The development method in this design is in the form of a game, namely Smart dental card game model (13).

The senses that are used to play Smart dental card games are the eyes and ears. It is supported by previous research that most of a person's knowledge is obtained through the eyes and ears. The smart dental card game model consists of 32 cards and nine keywords packaged in a board game. Smart dental card games' advantages include: Practical, exciting pictures, easy to understand the content, easy to present, can be played anywhere, easily stored, can be used for large or small groups so students can be actively involved in the presentation. In addition to physical strengths, Smart dental card games can also improve students' speaking and listening skills due to the interaction between students at school (14).

The knowledge paired effectiveness test results show that the p-value is 0.001, which means that the Smart dental card game media model effectively increases the ability about maintaining dental health and decreasing the index of debris index in elementary school students.

The increase in knowledge occurred during the process of implementing the smart dental card game model. Researchers were directly involved in providing education about dental health maintenance to elementary school children (15). It was due to the researcher could transfer knowledge and transfer of skills to elementary school students and take the initiative to develop various activities related to promoting dental and oral health in schools (16). Provision of knowledge on dental and oral health maintenance for elementary school children needed since primary school is a very strategic group for dealing with dental and oral health problems (17).

The success of the Smart Dental Card Game Model was a decline in the debris index score of elementary school children. Due to the students who had been taught to understand the practice of brushing their teeth correctly and adequately using the Smart Dental Card game model for ten days. This is supported by previous research which states that the act of brushing teeth can clean soft deposits on the surface of teeth and gums, brushing teeth is a preventive action towards optimal oral health (18-19)

CONCLUSION

The smart dental card game model effectively increases knowledge of dental and oral health maintenance than flipchart and phantom media.

RECOMMENDATION

Based on the Smart dental card game model's research results to improve the dental health maintenance behavior of elementary school students. Further study needs to conduct models, methods, and learning media for other school children's dental health using different populations. The institution could also implement the Smart dental card game to improve elementary school children's dental health care behavior.

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