



# Android-Based Dental Disease Education Model in Improving Adolescent Dental Health Maintenance Skills

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## ABSTRACT

Background: Dental and oral health is critical to pay attention to in addition to other general body health. Students who experience caries and gingivitis in industrialized countries by 60-90%. Efforts to overcome these problems through the UKGS program. However, the program still has obstacles, including the health education media provided is still conventional. Educational media that are currently developing among adolescents are technology-based. Purpose: Produce an android-based dental and oral disease education model that effectively improves adolescent dental health behaviour. Methods: Research and Development (R&D) and model testing using a quasi-experiment design (pre and post-test with control group design), model feasibility measurement instruments and skills using a questionnaire. Data were tested using the Wilcoxon test and the Mann-Whitney test. The study subjects were divided into two groups, namely the intervention group of 45 children and the control group of 45 children. Result: Android-based education model is feasible as a medium for dental health education ( $p = 0.004$ ) and effective in improving adolescent skills ( $p = 0.000$ ). Conclusion: Android-based education can potentially improve adolescents' dental and oral health maintenance skills.

## INTRODUCTION

Dental and oral health is critical to pay attention to in addition to other general body health. Some people do not prioritize dental and oral health because they think toothache is not a fatal disease, while teeth and mouth are the gateway for germs to enter so that they can interfere with the health of other body organs (Nurdianti et al., 2019). Research by Arfajsyah *World Health Organization* (WHO) considers that a common disease that develops among the entire world community is dental and oral (Arfajsyah et al., 2018). The Basic Health Research of the Indonesian Ministry of Health 2018 reported that 73.4% of adolescents aged 10-14 years experienced caries, swollen gums or pulpitis 23.6%, and stomatitis/sprue 17.4%. Surveys conducted in the United States and Denmark obtained data on gingivitis and periodontitis in adolescents by 60% (Indonesian Health Research and Development Agency, 2018).

Health development in Indonesia today this, as stated in Health Systems National, continue to put forward efforts Improved Health (Promotive) and prevention (preventive) with Community Empowerment and Independence as the basis for its implementation. According to Budiharto (2013) in Roza et al, (2018) dental health and the mouth is closely related to behavior. Health maintenance behaviors Good teeth and mouth will go a long way in ensuring degrees the health of each person. Therefore, dental health maintenance behavior and the mouth that is not good must be changed. The environment plays a very important role in formation of one's behavior, in addition to innate aspects. Behavior is Everything activity is done by an individual (someone), either of which can observed (seen) directly or indirectly.

According to *World Health Organization* (WHO), the group of adolescents who enter school age are 12-15 years old, namely those attending junior high school. This age group still needs guidance in maintaining oral health (Gani S, Suryana M, Fuad H.A, 2020). The government has made efforts to overcome this problem by promoting dental and oral health in the UKGS program (Mardeilita, 2019). UKGS (School Dental Health Effort) is a dental health effort to maintain and improve the dental health of students in target schools supported by curative measures for students who need treatment (Santoso et al., 2015). Health workers carry out health efforts in healthcare facilities, including disease prevention and health promotion (Lake et al., 2017).

The program has been implemented, but several problems still need to be addressed, including the lack and uneven distribution of medical personnel. Hence, there is less time and opportunity to

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communicate (Agustin. Nandya Andila, 2018) (Susilo et al., 2019). the provision of dental health education still uses conventional media. However, this media still has drawbacks; it is easily damaged, and the message needs to be fully conveyed because sometimes there are only pictures without information (Bayu Andoro, Fayola. Regnata Revi, 2018). The success of health education is influenced by media that attract attention so that the delivery of material will be more effective.

The 'digital natives' generation is a category of internet users in Indonesia who were born after 1980. The characters of this age category have skills in operating internet-based technologies and are very active in using digital technology networks (Siregar P.A, Reni A.H, 2020). Teenagers in Indonesia get the third most internet users (Fayola et al., 2018). Individuals who have mobile phones in Indonesia are 77% or around 196.7 million people. Aged 9-15 years, 62.8% use mobile phones and 51.4% use smartphones (Siregar P.A, Reni A.H, 2020).

Educational services on dental and oral health need to be improved in supporting access oriented to the quality of individual health according to the industrial revolution 4.0 so that it needs to be managed comprehensively through integrated technology (Lendrawati, 2019). The field of Information Technology (IT) has been widely used and applied as a solution to address dental and oral health problems (Prasetyaningrum et al., 2020).

## METHOD

This study uses the Research and Development (R&D) development method which is used to produce an Android-based dental disease education model in improving adolescent dental health maintenance skills and testing the effectiveness of dental health maintenance skills after using the application that has been designed. The research and development procedure includes five main steps, namely:

1. Information gathering

Collecting information to obtain data by conducting interviews with the Semarang City Health Office (public health department), the Semarang City Education Office (Junior High School Department), junior high school principals, junior high school teachers and health workers (dentists and dental therapists).

2. Model design

The preparation of the " Android-Based Dental Disease Education Model in Improving Adolescent Dental Health Maintenance Skills" uses system development using the Rapid Application Development (RAD) method

3. Expert validation and revision

The feasibility of the Android-based dental and oral disease education model was carried out by expert validators, totalling 3 people consisting of IT (Information Technology) experts, dental health education experts and media experts. This validation was carried out using a questionnaire containing 18 questions from each expert validator.

4. Model testing

Model trials were conducted at junior high school 21 Semarang as the intervention group and junior high school 26 Semarang as the control group.

5. Model results.

The research design used Quasy Experiment Design with the pre-post test with a control group design, and the selection of respondents was not done randomly. Respondents consisted of 90 junior high school youth aged 12-15 years. The minimum sample size is calculated based on the sample size by Sastroasmoro et al., with  $\alpha = 0.05$  and power = 0.90. The minimum sample size required is 90. The sample is divided into two groups, namely 45 intervention groups and 45 control groups. Students in this study were taken from SMPN 21 and SMPN 26 Semarang.

The instrument for measuring skills uses a validated questionnaire with a Cronbach alpha value of 0.890, which means that the questions on the questionnaire are declared reliable. Some steps in the research data collection technique carried out are: primary data are taken and processed directly by researchers based on the results of instruments in the form of direct interviews with respondents and assessment questionnaires and secondary data are obtained from journals and books to obtain information directly related to research needs. The research data uses an interval scale, statistical tests interclass correlation coefficient to test the feasibility of the model, while the normality test uses the kolomogorov-smirnov test because the number of respondents is more than 50. The effectiveness test on abnormal data uses the wilcoxon test and the mann-whitney test.

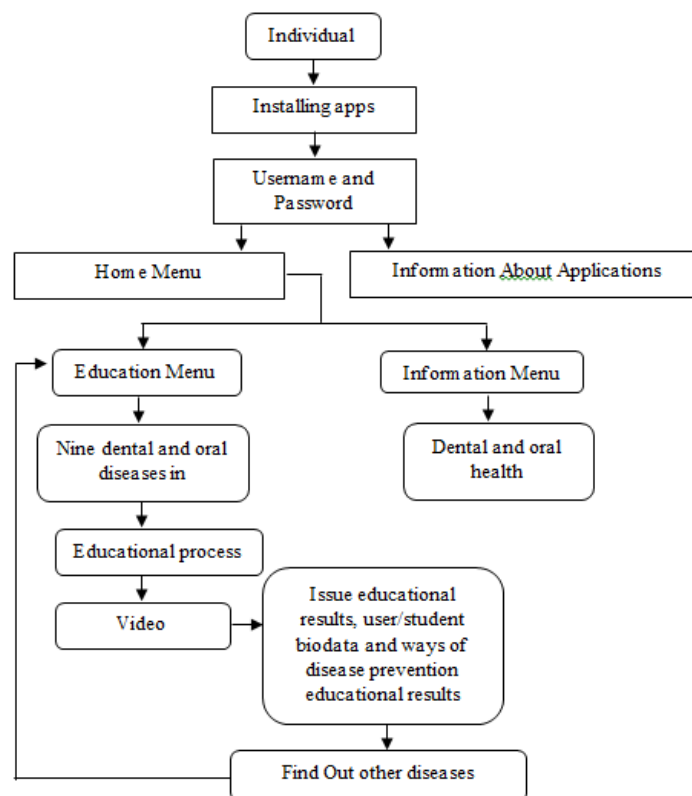
**RESULT**

**A. Information Collection**

The results of information collection were carried out using interviews and methods of systematic review, which can be concluded that the characteristics of adolescents vary where at this age, they are in a transitional phase from childhood to adulthood. Efforts that need to be made to improve dental health are focused on prevention through dental and oral health education. The selection of dental health education should be effective and easily accessible.

**B. Plan Build Model**

The "Android-Based Dental and Oral Disease Education Model" design uses system development using the Rapid Application Development (RAD) method, along with the RAD stages: design planning, RAD design workshops, and implementation. Model design is based on the results of data collection. The substance of the model contains dental disease, how to prevent it and how to care for teeth that are good and right.



*Figure 1. Android-Based Educational Model*

**C. Expert Validation**

**Table 1. Expert Validation Very Worth It**

Expert Validation				
N	F(%)	Mean	Categorically	p-value*
18	92%			
18	98%	96	Very Worth It	0,004
18	98%			

\*Interclass correlation Coefficient

Table 1 shows that the results of expert validation have a p-value of 0.004 (<0.05), which means that the android-based dental and oral disease education model to improve adolescent oral health maintenance behaviour is appropriate as a media for dental health education.

## D. Model Testing

**Table 2. Data Normality Test**

Variable	p-value	
	Intervention	Control
Skills <i>pre-test</i>	0,036	0,001
Skill <i>post-test</i>	0,000	0,029

Based on the results of the data normality test in the table, skills *pre-post test* Not normally distributed because the  $p\text{-value} < 0.05$ . There are some data that are not normally distributed so that the next test used is a non-parametric test, namely the Wilcoxon test and the Man-Whitney test.

**Table 3. Respondent Characteristics Data**

Variable	Intervention		Control		P-Value
	N	(%)	N	(%)	
Gender					
Man	18	40	16	35,6	0,668
Woman	27	60	29	64,4	
Class					
VII	19	42,2	21	46,7	0,676
VIII	26	57,6	24	53,3	

A total of 90 junior high school youth in this study with male gender were 18 (40%) and 16 (35.6%), female were 27 (60%) and 29 (64.4%) in the intervention and control groups. Class VII 19 (42.2%) and 21 (46.7%), class VIII 26 (57.6%) and 24 (53.3%) in the intervention and control groups. Table 2 shows no significant difference between the two groups in the characteristic data ( $p = > 0.05$ ).

**Table 4. Youth Skills Effectiveness Test**

Group	Mean±SD	Mean±SD	P-value
	Pre-Test	Post-Test	
Paired Data Test*			
Intervention	9,80±2,735	13,40±1,827	0,000
Control	10,76±3,556	11,67±2,620	0,108
Unpaired Data Test**			
	Mean±SD	Mean±SD	
	Pre-Test	Post-Test	
Intervention	9,80±2,735	13,40±1,827	
Control	10,76±3,556	11,67±2,620	
P-Value	0,074	0,001	
Unpaired Data Test Change Value ( $\Delta$ )**			
	Mean±SD		
	Pre-Post Test		
Intervention	3,60±2,775		0,000
Control	0,91±3,878		

Table 3 shows the effectiveness test of paired and unpaired data on skills. The paired data test showed that the p-value of the intervention group was 0.000 ( $p < 0.05$ ), meaning that the android-based dental disease education model was effective in improving adolescent skills. The p-value of the control group was 0.108 ( $p > 0.05$ ), meaning that the application in the control group was not effective in increasing adolescent skills.

The effectiveness test of unpaired data showed that the p-value in the pre-data was 0.074 ( $p > 0.05$ ) and in the post-data was 0.001 ( $p < 0.05$ ) with a mean higher than the control, meaning that the dental disease education model was based Android is more effective in improving youth skills compared to the application used in the control group.

E. Model Results

The resulting product is an Android-based application to prevent dental and oral health problems in adolescents.

1. Menu Display *Log in*



*Figure 2. Menu Log in*

2. Home Menu Display

The home menu page has two main menus, namely an educational menu and a general dental health information menu.



*Figure 3. Educational Menu*



Figure 4. Application Information Menu

## DISCUSSION

The adolescent period in dental health is characterized by several oral disease problems experienced, including gingivitis, periodontitis, caries, dead teeth and pulpitis. This is due to low dental health maintenance behaviour. To shape the behaviour of maintaining dental and oral health in junior high school adolescents, an educational method with exciting and not dull media that directly involves adolescents is needed so that it can stimulate adolescent students to make changes in sound and correct dental health behaviour. Following the opinion of Putu (2012) said, the success of health socialization as an effort to improve health depends on the media used when conveying socialization to create community participation. Engaging media in health education will make it easier to convey health messages so that the target can quickly receive messages clearly and precisely (Ladytama. Sarah, J. Sugiarto, 2018).

Technological developments also play an essential role in advancing the health sector in the current 4.0 era. Technology is currently a means for health workers to convey health information to the public. Information conveyed through the media needs to be matched with the target to receive the information optimally (Abral et al., 2020). Implementation of dental health education requires media. *Media* is a tool that influences health education in conveying information to individuals/groups that can be touched, felt, heard or smelled to generate interest in the target, facilitate the provision of health information, and generate a person's desire to know, explore and do. Media is divided into print media and electronic media.

*Electronic media* is media that involves the senses of a person. The advantages of this electronic media include that it is easier to understand, includes all five senses, and has sounds and moving images to attract more attention. Designing android-based dental and oral health education media requires a data collection technique in which participants are free to discuss with each other without fear or worry about the opinions they will issue. The technique is Focus Group Discussion (FGD) or Focus Group Discussion. The results of the expert validation show that the average value of the three experts is 96 with very feasible and value categories-value is 0.004 ( $p < 0.05$ ), which means that the dental and oral disease education model is based android suitable for use as a media for dental and oral health education in junior high school adolescents. Expert validation is significant in developing a model to assess the theory's feasibility. The concept and the feasibility of the model to produce a valuable model to improve the quality of education. Validation is carried out by experts with extensive experience and insight (Prasasti AK et al., 2019).

This Android-based dental disease education model is provided to adolescents to improve dental and oral health care by looking at the increase in adolescent knowledge and attitudes. Increased knowledge and attitudes towards dental health maintenance were identified using a questionnaire. The Mann-Whitney skills statistical test results show ( $p$ -value = 0.000 Table 3). According to Budioro (2013) in Junaidin (2020), behaviour is a response to individual actions observed in both passive and active forms. These passive forms occur within humans and cannot be seen directly by humans through knowledge, attitudes and perceptions. The better knowledge will affect the attitude for the better. A good attitude will be implemented into dental and oral health maintenance skills (Junaidin et al., 2020; Widyastuti N et al., 2020).

The increase in skills in maintaining dental health in junior high school adolescents is due to an educational model based on dental and oral diseases android equipped with materials and pictures, videos

and information in the form of posters on how to maintain excellent and correct dental and oral health so that the information in the educational model can be used by students repeatedly, according to research conducted by Hasrini et al. (2020) that the video method increases students' actions towards personal *hygiene* and dental health status.

Providing education to children requires media appropriate to the developmental stages of school-age children (Majid YA et al., 2020). As time goes by and the increase in sophisticated equipment requires Android-based electronic media that can help humans overcome health problems. Engaging educational media can arouse the enthusiasm and motivation of children's learning. *Engaging media* contains colourful pictures and videos that are easy to understand so that the education given to children is varied (Pramudita et al., 2020). Presenting images and information has a long-term impact on memory (Majid YA et al., 2020).

## CONCLUSION

An adolescent age group is an age group that is tough to accept change and is prone to dental and oral diseases. Hence, an educational method with exciting and not dull media that directly involves adolescents can stimulate students to make changes in sound and correct dental health behaviour.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest

## ETHICAL CLEARANCE

All participants signed the informed consent prior to the data collection.

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