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EFFECT OF SMART BOX MEDIA ON ORAL HEALTH KNOWLEDGE OF STUDENTS AT SDN KELAYAN BARAT 3

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ABSTRACT
Background: *Oral health problems are still one of the things that cannot be overcome in Indonesia, especially in children. This is due to behavioral factors ignoring oral hygiene based on lack of knowledge. This knowledge can be improved by conducting health promotion using attractive and interactive media such as smart box media. The advantages of this media are easy to use and children can learn while playing which is then able to develop children's cognitive abilities optimally.* ***Purpose:*** *To analyze the effect of smart box media on oral health knowledge in students aged 9-11 years.* ***Methods:*** *Quasi-experimental research with non-equivalent control group design with purposive sampling technique. The population of this study were students aged 9-11 years at SDN Kelayan Barat 3 Banjarmasin with a sample of 48 respondents. The instrument used was a questionnaire with 12 questions. The analysis used was Wilcoxon and Mann whitney test.* ***Results:*** *The Wilcoxon test showed that a significant increase in knowledge occurred after the intervention using smart box media ($p<0.001$).* ***Conclusion:*** *Smart box media is effectively used in oral health promotion to improve children's oral health knowledge in students aged 9–11 years.*

Keywords*: smart box, dental health education, oral health knowledge.*

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INTRODUCTION

Oral health is an integral part of general health. A healthy mouth means being free from oral health problems so that there are no limiting disorders in biting, chewing, smiling, speaking and psychosocial well-being.[1] Oral health problems are still one of the unresolved issues in Indonesia. The Indonesian Health in 2023 stated that oral health problems in Indonesia were still very large at 56.9%. South Kalimantan Province is one of the provinces in Indonesia with a percentage of cases of oral health problems higher than the national rate of 57.7%.[2] Elementary school-age children in South Kalimantan have a percentage of oral health problems of 59.56%.[3]

Oral health problems that often occur in children are dental caries or cavities, uneven teeth, debris, plaque on the teeth, tartar, mouth ulcers, and bad breath.[4] One of these problems is caused by behavioral factors ignoring dental hygiene and oral hygiene based on a lack of knowledge. Knowledge about oral health can be improved by conducting health promotion.[5,6]

Health promotion often uses lecture and demonstration methods, which have the disadvantage of being too monotonous and children become passive because children only play the role of listeners and spectators so that they can cause boredom.[7] Children with an age range of 7-11 years are at the concrete operation stage in cognitive development where children prefer activities to classify types of objects. One of the media that is in accordance with the characteristics of children a the concrete operation stage is *smart box* media.[8]

Smart box is a media that aims to improve children's memory ability on oral health knowledge. The use of *smart box* media is interesting for children because it can make children explore according to their abilities and train children's thinking in solving oral health problems contained in *smart box* media.[9] The advantage of *smart box* media over other media is that children can increase their enthusiasm for learning and have an impact on improving cognitive learning outcomes because students not only learn but also learn while playing.[10] Few studies have evaluated the impact of interactive media, such as the *smart box*, on oral health education in elementary-aged children in Indonesia.

Elementary School of Kelayan Barat 3 Banjarmasin is one of the elementary schools located in South Banjarmasin District which still has problems related to oral health knowledge. The results of interviews conducted with school officials stated that at SDN Kelayan Barat 3 there had been no oral health promotion for a long time, resulting in a lack of exposure to information about oral health to students. The school also stated that the last oral health promotion was carried out using lecture and demonstration methods which were considered less effective, causing low student knowledge about oral health and many students experienced oral health problems.

Based on this description, the researcher is interested in conducting oral health counseling using media that is more interesting for children, so a study was conducted on the effect of *smart box* media on the level of oral health knowledge of elementary school children among students aged 9–11 years at SDN Kelayan Barat 3 Banjarmasin

MATERIALS AND METHODS

This research has been approved by the Health Research Ethics Commission of FKG ULM with *Ethical Clearance* Letter No.033/KEPKG- FKGULM/EC/X/2024. This research was conducted using a *quasi experimental* method using a *nonequivalent control group design*. The population in this study were students aged 9-11 years at SDN Kelayan Barat 3 Banjarmasin. The sample size in this study was taken with *purposive sampling* technique so that 48 samples were obtained which were then divided into 2 groups, namely 24 children in the group given *smart box* and 24 children in the control group poster by meeting the inclusion and exclusion criteria. The inclusion criteria in this study were third and fourth grade students at SDN Kelayan Barat 3 Banjarmasin, students aged 9-11 years at SDN Kelayan Barat 3 Banjarmasin, parents / guardians who signed informed consent, and cooperative students. The exclusion criteria in this study were students who didn't participate in the study until it was completed (drop out) and students with disabilities.

Figure 1. *Inside view of Smart Box Media*

Knowledge assessment was measured using a 12-question questionnaire with a *Guttman* scale. Correct answers will be scored 1, while incorrect answers will be scored 0. The scores obtained are then added up and categorized (high, medium, low).The questionnaire was tested for validity (r >0.05) and reliability (Cronbach's alpha = 0.812). The materials and media used in this study have been tested for validity by media and material experts.

The study began with giving an explanation to ask for respondents' consent through a letter of consent signed by the parents/guardians of the students concerned. Furthermore, students were given a *pre-test* regarding knowledge of maintaining oral health in each group. After that, students were given health promotion in each group, namely the group given smart box and the control group given poster for 30 minutes by the researcher. Then, students were given a post-test to determine changes in their knowledge.

The data from this study were then subjected to statistical tests with the SPSS application program. The statistical tests used were the Wilcoxon test and the Mann Whitney test. The Wilcoxon test was used to measure the knowledge of maintaining children's oral health before and after being given health promotion between paired data groups. The Mann Whitney test was used to determine whether there was a difference in the level of knowledge of maintaining oral health in the group given a *smart box* and the control group. The level of significance used is $p< 0.05$.

RESULTS

Table 1. Comparison of Knowledge Levels Before and After Intervention in the Smart Box Group

Smart box	Knowledge Level			*p value*
	Low	Medium	High	
Before	6 (25%)	10 (41.7%)	8 (33.3%)	<0.001
After	0 (0%)	0 (0%)	24 (100%)	

There was a 66.7% increase in high knowledge category post-intervention in smart box group. Data analysis with the Wilcoxon test shows a significance value of <0.001, which is <0.05, thus indicating that H_0 is rejected, which means that there is a significant difference between knowledge of maintaining oral health before and after health promotion using smart box media.

Table 2. Comparison of Knowledge Levels Before and After Intervention in the control Group

Control	Knowledge Level			*p value*
	Low	Medium	High	
Before	8 (33.3%)	9 (37.5%)	7 (29.2%)	<0.001
After	0 (0%)	13 (54.2%)	11 (45.8%)	

There was a 16.6% increase in high knowledge category post-intervention in control group. Data analysis with the Wilcoxon test shows a significance value of <0.001, where this value is <0.05, this indicates that H_0 is rejected, which means that there is a significant difference between knowledge of maintaining oral health before and after health promotion using poster media.

Table 3. Comparison of Knowledge Levels Before and After Intervention in the Smart Box Group and control Group

Group		Knowledge Level			*p value*
		Low	Medium	High	
Smart box	Before	6 (25%)	10 (41.7%)	8 (33.3%)	0.001
	After	0 (0%)	0 (0%)	24 (100%)	
Control	Before	8 (33.3%)	9 (37.5%)	7 (29.2%)	
	After	0 (0%)	13 (54.2%)	11 (45.8%)	

The results showed a difference in knowledge improvement between the group given the *smart box* and the control group. The group given the smart box experienced an increase of 66.7%, while the control group experienced an increase of 16.6%, so the difference in knowledge increase was 50.1%. The results of data analysis using the *mann whitney* test obtained a significance value of 0.001 ($p < 0.05$) indicates the decision H_0 is rejected, which means that there is a difference in knowledge between the groups given smart box and controls after health promotion.

DISCUSSION

The *pre-test* results showed that the knowledge level of the intervention group and the control group before health promotion was in the Moderate Category, and the questions that received low scores were related to material on risk factors for oral health problems and visits to the dentist. This study aligns with Pratiwi's research, which showed that the knowledge level of elementary school children before health counseling was mostly in the Moderate Category, with a percentage of 55%.[11]

The Moderate Category knowledge may occur because the children had previously studied the material presented. Boihaqi states that knowledge is the recall of material that has been learned, enabling an individual to recall a set of learning materials obtained from theory.[12] The Principal stated that oral health promotion had previously been given to students at SDN Kelayan Barat 3 Banjarmasin when the respondents were still new students at school, making it possible for children to remember material presented previously.

Knowledge after health promotion in the group given *smart boxes* experienced a significant increase in the High Category. This study is in line with Prayitno who stated that before health promotion was carried out, students' understanding of the material presented was identified as low, while after health promotion using *smart box* media, there was a significant increase in students' knowledge because they could play *smart box* media directly.[13]

Hamalik also stated that the use of learning media in the teaching and learning process can arouse new desires and interests as well as generate motivation and stimulation of learning activities. The use of learning media at the stage of learning orientation will greatly assist the effectiveness of the learning process and the delivery of messages and lesson content at that time. In addition to arousing student motivation and interest, learning media can also help students improve understanding, present data in an interesting and reliable manner, facilitate data interpretation, and condense information.[14]

The increase in knowledge through *smart box* media is also in line with children's cognitive development where children with concrete cognitive stages prefer to take part in learning with the type of learning while playing, classifying or classifying something so that children in the *smart box* intervention group have a higher increase because the learning process is carried out in accordance with their developmental stage.[8]

The *post-test* results in the control group showed an increase in knowledge in the High Category. The control group can experience an increase because in this group health promotion is also carried out using other media, namely posters. The increase in knowledge scores in the control group can also be influenced by the level of curiosity, experience and exposure information which is Knowledge is derived from seeing and hearing from other sources of knowledge *such* as teachers or the media. Knowledge comes from seeing and hearing from other sources of knowledge such as teachers or the media.[15,16]

The group given the *smart box* had a higher percentage increase in knowledge because the *smart box* was designed with the aim of providing a more interesting and interactive learning experience than conventional learning methods. This media not only presents the subject matter statically, but also provides interactive quizzes so as to increase student engagement in the learning process. *Smart box* media can create an interactive learning environment, so that students can be more actively involved in learning. Aminah stated that the use of *smart boxes* can significantly increase students' knowledge of the material presented.[17,18]

The results showed that there was a significant difference between before and after health promotion in the group given the *smart box*. This study is in line with Abral which states that there is an increase in oral health knowledge after counseling using *smart box* media.[7] Humaira also stated that *smart box* media contains learning materials as well as games that can help children promotively and preventively in maintaining oral health. Increased knowledge of oral health through health promotion using this *smart box* media can occur because children are more interested in learning while playing the types of games contained in it. This media has a unique and attractive appearance from each side that can provide information to children about maintaining oral health.[19]

The results also showed that there were differences between before and after health promotion in the control group who were given health promotion in the form of poster media. The control group can experience an increase in knowledge caused by exposure information obtained through other sources of knowledge such as teachers and media, which in this study used poster media. Experience when answering *pre-test* questions can also be the basis for students to increase their confidence when answering *post-test* questionnaires.[15]

The increase in knowledge in the groups given *smart boxes* and controls has a significant difference. This study is in line with Yuliastri and Syahari who stated that there was a significant difference in knowledge between the group given the *smart box* compared to the control group. Knowledge in the group given the *smart box* experienced a fairly high increase of 40%, while in the control group it was only 22.2%. This difference occurred because children in the group given *smart box* media showed a sense of *excitement* to learn because the media used could attract their attention, so that children became more enthusiastic and absorption of the material presented was also better.[9,20]

Students interest in learning is the full engagement of a student in all mental activities with full attention to acquire knowledge and achieve understanding of the knowledge being studied. Children who are interested and enthusiastic about the learning process will also absorb the material well. A child who has a desire to learn will quickly understand and remember the learning material; therefore, interest has a significant influence on the learning process.[21]

Children in the control group tended to feel bored because they were only listeners and there was no interaction, thus reducing their motivation to understand the material presented.[7] The results of data analysis showed that there were differences in knowledge between the intervention and control groups after health promotion. The data analysis is in accordance with the research hypothesis, namely that there is a difference in the effect of *smart box* and poster to the level of oral health knowledge. *Smart Box* media have been shown to be effective for short-term health promotion, but there is no strong evidence that their impact continues in the long term, which is a limitation of this study. More in-depth research with periodic follow-ups and a robust experimental design is urgently needed.

Based on the research results, there was a significant increase in oral health knowledge scores among elementary school students aged 9–11 years, from 33.33% to 100% ($p< 0.001$). This indicates that the smart box media can effectively improve students' understanding of oral health concepts in the context of health promotion. This study makes a substantial contribution to the field of education by implementing an interactive educational approach that not only strengthens mastery of the material but also meaningfully increases student motivation and engagement, thereby serving as an innovative alternative teaching method in health education.

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