Journal Center of Excellent : Health Assistive Technology
Volume 4, Number 1, Tahun 2026, pp. 41-46
ISSN (Online): 2987-2200 DOI: 10.36082/jchat.v4i1.3080
Open Access: https://ejournal.poltekkesjakarta1.ac.id/index.php/jchat



Ludo Game in Improving Dental Health Knowledge in Elementary School

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ARTICLEINFO

Article history:
Received: March 4, 2026
Revised: March 25, 2026
Accepted: March 29, 2026
Available online: March 31, 2026

Keywords:
Knowledge, oral and dental health, Ludo game

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ABSTRACT

Background: Dental and oral health problems remain common among elementary school children and may disrupt their daily activities and overall quality of life. One major contributing factor is the lack of knowledge about proper oral hygiene. Engaging and interactive educational methods, such as the Ludo game, can help improve students' understanding in a fun and enjoyable way. **Objective:** To analyze the effectiveness of dental health knowledge improvement before and after educational intervention using Ludo game media. **Method:** his study employed a pre-experimental with a one-group pretest-posttest design. A total of 32 students were selected as samples using a total sampling technique. Data were collected through questionnaires administered before and after the educational intervention, and analyzed using a paired t-test. **Results:** The average knowledge score before the intervention was 8,97 increasing to 13,91 after the intervention. The *Paired t-test* showed a p-value < 0.001, indicating a significant improvement. **Conclusion:** The Ludo game is effective in increasing dental health knowledge.

INTRODUCTION

Oral and dental health is the state of the mouth, teeth, and related elements within the oral cavity being in a healthy condition, thereby enabling an person to perform essential functions such as eating, breathing, speaking, and social interaction (Ambarkova, 2025). Oral health also encompasses psychosocial dimensions such as self-confidence, well-being, and the ability to socialize and work without pain or discomfort (Ferreira et al., 2020). One of the primary causes of oral health problems in the community is behavioral factors or an attitude of neglecting oral hygiene (Purnama et al., 2020)

The World Health Organization's 2022 Global Oral Health Status Report estimates that oral diseases affect nearly 3.5 billion people worldwide (World Health Organization, 2022). Based on the 2023 Indonesian Health Survey, it is stated that as many as 48.8% of elementary school-aged children (10-14 years old) have oral health issues (Kemenkes RI, 2023). This problem is also prevalent in other countries; for instance, research by (Orfali et al., 2023) indicates that the prevalence of dental caries in Saudi Arabia among school-aged children (6-15 years) is 65.6%. Other research (Van Chuyen et al., 2021) shows that 59.4% of the 11–12 year age group experienced caries.

The high incidence of dental health problems among school-aged children can lead to impaired quality of life and disruption of daily activities due to the inability to masticate properly (Erdiyani et al., 2023). Poor oral conditions, characterized by significant tooth loss resulting from untreated decay or trauma, interfere with the functions and activities of the oral cavity, which in turn affects nutritional status and impacts quality of life (Fadjeri et al., 2021).

Several factors contribute to the high prevalence of oral health issues, including behavioral factors such as indifference toward oral hygiene (Purnama, Sasongko, et al., 2024). This is often due to a lack of knowledge; the knowledge possessed by an individual can foster awareness of the importance of oral health. When the level of knowledge is high, the awareness to maintain oral health also increases. Conversely, one factor in the emergence of oral health problems is behavior that ignores dental hygiene (Octavianita et al., 2024). According to (Noviani et al., 2023), behavior plays a major role in maintaining oral health and is a key factor affecting the health status of school-aged children.

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Efforts to improve the dental health knowledge of school-aged children can be made through oral health promotion in the form of dental health education. Dental health promotion is a process of providing information based on oral health needs, aiming to increase the knowledge, understanding, and awareness of individuals to maintain their oral cavity properly (Nasution et al., 2023).

Maintaining oral health can be achieved through education. Dental health education is a planned and directed effort to create an environment where individuals or groups are willing to change old, unfavorable behaviors into more beneficial ones to improve their standard of living (Purnama et al., 2024). Health education is necessary as an effort to enhance skills, awareness, attitudes, and actions (Noviani et al., 2023). In conducting education, the role of media can be a success factor during dental health counseling for school children. Educational media is a set of auxiliary tools or supplements used by educators to communicate with students. Therefore, media plays an important role in supporting the educational process and making it easier for students to understand the material provided. Additionally, media can make the messages delivered more engaging and easier to comprehend (Kasihani & Muslim, 2021).

Educational delivery can be carried out through play. By playing, students gain direct knowledge from various aspects, including cognitive, affective, and psychomotor domains. Direct knowledge in the cognitive domain, such as guessing games, puzzles, video games, or games with simple or standard rules, allows students to increase their knowledge (Batea et al., 2023). Other research (Herawati et al., 2022) demonstrates that dental health education can improve oral health knowledge, as seen from the average knowledge level increasing from 25% before education to 70% after the intervention.

Another interactive game media that can be used is the Ludo game. Ludo involves moving four pawns using dice; the winner is the player who passes through all the opponent's columns and places four pawns in the designated home area (Mawarni et al., 2020). Using this media encourages students to be more enthusiastic and aims to improve children's knowledge. The Ludo game has advantages in training the cognitive abilities of school-aged children regarding ways to maintain dental health.

METHOD

This study employs a pre-experimental method with a one-group pretest-posttest design. This design involves a pretest prior to the intervention and a posttest afterward to accurately evaluate the effectiveness of dental health education using Ludo games in increasing the knowledge. The population consists of all 32 students in class VA at SDN Ratu Jaya 1 Depok. Using a total sampling technique, all 32 students were selected as the research sample. The study was conducted on April 2025, at SDN Ratu Jaya 1, located in Cipayung, Depok City, West Java.

The primary variable is dental health knowledge, defined as the students' ability to answer questions regarding dental health before and after the intervention. Measurement is conducted using a questionnaire with the following criteria: good (>75%), fair (56–75%), and poor (<56%) (Arikunto, 2017). The instruments used include informed consent forms, Ludo game media, and a modified questionnaire consisting of 15 questions to measure knowledge levels (Octavianita et al., 2024). Data collection was assisted by eight trained final-year dental health students to ensure consistency in perception.

Research implementation spanned three weeks with three interventions. Following (Octavianita et al., 2024), pre-tests and post-tests were administered with a five-day interval to minimize recall bias while ensuring the measured variables remained relevant. The process included research licensing, respondent orientation, and two primary educational visits using Ludo games played individually for 60 and 40 minutes, respectively. Data processing begins with editing to check the completeness of questionnaires, followed by coding to convert responses into numeric format. Subsequently, data entry is performed to input information into computer software, and finally, cleaning is conducted to verify data and ensure no entry errors occurred. Data were simplified for interpretation using bivariate analysis via SPSS software. A normality test was first performed to determine the appropriate statistical test; a paired sample t-test was planned for normally distributed data, while the Wilcoxon test was reserved for non-normally distributed data

RESULT

This study utilized primary data obtained directly from fifth-grade students (Class VA) at SDN Ratu Jaya 1. The research instruments included informed consent forms, pretest and posttest questionnaires consisting of 15 multiple-choice questions regarding dental health, and educational media in the form of a

Ludo game. Data collection was conducted on April 10, 14, and 16, 2025, within the VA classroom at SDN Ratu Jaya 1, Depok.

The data collection process commenced on the first day (April 10) with an explanation of the study, the signing of informed consent, and instructions on completing the 15-question questionnaire, followed by a 60-minute educational session using the Ludo game. On the second stage (April 14, 2025), a 40-minute follow-up session was conducted where students played the Ludo game individually. In the final stage (April 16, 2025), respondents completed a posttest questionnaire to evaluate their dental health knowledge following the Ludo game intervention.

Table 1. Respondent Characteristics Based on Age and Gender

Characteristics	Frequency	Percentage (%)
Age		
10	2	6,3
11	19	59,4
12	11	34,4
Total	32	100
Gender		
Boy	19	59,4
Girl	13	40,6
Total	32	100

Table 1 indicates that the total number of respondents is 32. Respondents aged 10 years old consist of 2 students (6.3%), those aged 11 years old consist of 19 students (59.4%), and those aged 12 years old consist of 11 students (34.4%). The majority of the fifth-grade students (Class VA) at SDN Ratu Jaya 1 Depok are male, totaling 19 students (59.4%), while female students account for 13 individuals (40.6%).

Table 2. Frequency Distribution of Dental Health Knowledge Level Before Playing with Ludo Media

Level of Knowledge	Frequency	Percentage (%)
Good	2	6,3
Fair	17	53,1
Poor	13	40,6
Total	**32**	**100**

Table 2 shows that before being given education using Ludo media to class VA students, 2 students (6.3%) had knowledge in the good category, and 17 students (53.1%) in the sufficient category and 13 students (40.6%) in the less category.

Table 3. Frequency Distribution of Dental Health Knowledge Levels After Ludo Game Education

Level of Knowledge	Frequency	Percentage (%)
Good	31	96,6
Fair	1	3,1
Total	**32**	**100**

Table 3 shows that after being given education using the Ludo game media, 31 students (96.9%) in class VA were in the good category and 1 student (3.1%) had a sufficient level of knowledge.

Table 4. Normality Test

Knowledge	*p-value*
Pre test	0,330
Post test	0,001

* *Saphiro-wilk*

Table 4 shows that the data on students' dental health knowledge produces a p-value of 0.330. The data is normally distributed because the p-value is p>0.05, so it is continued with a parametric test.

Table 5. Testing the Effectiveness of Students' Dental Health Knowledge Before and After Education with the Ludo Game

Knowledge Criteria	Mean	SD	*p-value*
Pre test	8,97	1,656	0,001
Post test	13,91	0,928	

Based on Table 5, the show that the average pretest score of 8.97 increased to 13.91 during the posttest with a p-value of 0.001 (p<0.05). These results indicate that the Ludo game is effective in improving students' dental health knowledge.

DISCUSSION

Educational media serve as auxiliary tools used by educators to convey material during the teaching-learning process (Firdaus & Ghonim, 2023). One learning approach currently undergoing significant development is gamification—the utilization of game elements in learning environments—which has been proven effective in enhancing students' knowledge (Latip et al., 2024). Designing engaging educational methods is a critical strategy to foster learning interest, ensuring that students remain enthusiastic, actively involved, and motivated (Duarmas et al., 2022). One form of such educational media is the Ludo game. The implementation of this media encourages students to learn actively, independently, and exploratively, thereby optimizing their understanding and mastery of the subject matter (Safira, 2024).

The results of this study indicate that prior to the intervention using the Ludo game, 17 students (46.9%) possessed a "fair" level of dental health knowledge. This finding is consistent with Azzahra et al. (2023), who reported that 39.85% of respondents had a fair knowledge level. This limited understanding often stems from a lack of comprehension regarding dental functions, the nature of dental caries, correct tooth-brushing techniques and timing, the importance of routine dental check-ups, and methods for clearing food debris. Environmental factors also play a significant role. According to Nabilla & Desmon (2022), children in this age group are heavily influenced by their social environment, particularly the family. The family is the primary environment for habit formation; parental support for good oral hygiene increases the likelihood of children adopting similar behaviors. Conversely, a lack of family prioritization of dental health reduces the child's motivation for proper dental care.

To improve the dental health knowledge of fifth-grade students (Class VA) at SDN Ratu Jaya 1 Depok, an intervention was conducted through Ludo-based education during two separate visits. The Ludo game, which involves two to four participants moving colored pawns to the finish line, was utilized as a learning medium to attract student attention, increase interest, and maintain a fun, non-monotonous atmosphere (Duarmas et al., 2022). In the first session, the game was introduced after the completion of the pretest questionnaire, during which respondents appeared enthusiastic and competitive. The second session focused directly on the execution of the game. Throughout these activities, students demonstrated high levels of enthusiasm and healthy competition, creating a dynamic yet conducive learning environment.

Following the intervention, nearly all students (31 respondents, or 96.9%) achieved a "good" category of dental health knowledge. This aligns with research by Mawarni et al. (2020), where 12 students (95.55%) demonstrated good knowledge levels using "Ludo Smart Geometry." This study highlights a significant difference in knowledge levels before and after the intervention, showing an increase from 53.1% at baseline to 96.9% post-intervention—a net gain of 43.8%. This substantial improvement suggests that students gained a better understanding of oral health maintenance after engaging with the Ludo game media.

Based on the paired sample t-test, a p-value of 0.001 was obtained, indicating that the Ludo game is statistically effective in increasing students' dental health knowledge. This is further supported by (Safira, 2024), which posits that the use of such media encourages active, independent, and explorative learning while optimizing material mastery. Consequently, the game successfully captured attention and motivated students to participate actively in the learning process. In conclusion, the Ludo game is an effective tool for knowledge enhancement, as educational methods that integrate play can significantly increase student focus and interest during the learning process.

CONCLUSION

This study that the Ludo game is an effective educational tool for enhancing dental health knowledge among elementary school students. These findings suggest that gamification through Ludo can be a valuable method for interactive health promotion in school settings.

ACKNOWLEDGE

The researcher expresses sincere appreciation to the faculty and students of SDN Ratu Jaya 1 Depok for their cooperation and participation in this study.

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