



Game-Based Educational Media: Comparison of Puzzles and Qugisaki in Improving Dental Health Knowledge

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ABSTRACT

Dental health issues need to be a global concern, almost half of the world's population suffers from dental and oral diseases. The DMF-T Index for primary school age children in Indonesia shows a decline from 7.1% to 5.4% in 2018 to 2023. But the severity falls into the high to very high category. Dental health education from an early age is very important to form habits that continue into adulthood. The use of game-based learning media such as puzzles and qugisaki can be one of the interesting and interactive educational alternatives. This study aims to find out the difference in the level of knowledge of grade IV students before and after being given dental health education using the media of puzzle games and qugisaki (Quartet Gigi Masa Kini). The research method is an experimental method with a pre-test and post-test design. The sampling technique used in this study is a total sampling of 64 students. The measurement was carried out by comparing the knowledge scores of pretest and post-test students after treatment using nonparametric statistical tests. The results showed that a significant increase in knowledge was obtained after being educated with puzzle and qugisaki media, with a p-value of 0.000 (<0.01). The average score of students' knowledge increased from 17.50 to 18.34 in puzzle media and 16.81 to 17.72 in qugisaki media. The analysis of the Man-Whitney test shows that there is a significant difference between the two media with a p-value of 0.049 (<0.05). Puzzle media has been proven to be more effective in increasing students' knowledge than qugisaki media and can be used as a dental health education tool. This research is expected to be developed into educational media such as augmented reality (AR) or educational game-based applications.

Keywords: Dental Health Education, Game Media, Knowledge, Puzzle, Qugisaki.

ABSTRAK

Masalah kesehatan gigi dan mulut perlu menjadi perhatian global, hampir setengah dari populasi di dunia mengalami penyakit gigi dan mulut. Indeks DMF-T anak usia sekolah dasar di Indonesia menunjukkan penurunan dari 7.1 % menjadi 5.4% pada tahun 2018 menuju 2023. Tetapi tingkat keparahan termasuk dalam kategori tinggi hingga sangat tinggi. Pendidikan kesehatan gigi sejak dini sangat penting untuk membentuk kebiasaan yang berkelanjutan hingga dewasa. Penggunaan media pembelajaran berbasis permainan seperti puzzle dan qugisaki dapat menjadi salah satu alternatif edukasi yang menarik dan interaktif. Penelitian ini bertujuan untuk mengetahui perbedaan tingkat pengetahuan siswa kelas IV sebelum dan sesudah diberikan pendidikan kesehatan gigi menggunakan media permainan puzzle dan qugisaki (Quartet Gigi Masa Kini). Metode penelitian adalah metode eksperimental dengan desain pre-test dan post-test. Teknik pengambilan sampel yang digunakan dalam penelitian ini adalah total sampling sebanyak 64 siswa. Pengukuran dilakukan dengan membandingkan nilai pengetahuan siswa pretest dan post-test menggunakan analisis statistik nonparametrik. Hasil penelitian menunjukkan bahwa peningkatan pengetahuan signifikan diperoleh setelah diberikan edukasi tentang kesehatan gigi dan mulut menggunakan media puzzle dan qugisaki, dengan nilai p 0,000 (<0,01). Rata-rata skor pengetahuan siswa mengalami peningkatan dari 17,50 menjadi 18,34 menggunakan media puzzle dan 16,81 menjadi 17,72 menggunakan media qugisaki. Analisis statistik dengan uji Man-Whitney menunjukkan bahwa terdapat perbedaan yang signifikan antara kedua media dengan nilai p 0,049 (<0,05). Media puzzle terbukti lebih efektif dalam meningkatkan pengetahuan siswa dibandingkan media qugisaki dan dapat digunakan sebagai media pembelajaran untuk edukasi kesehatan gigi. Penelitian ini diharapkan dikembangkan menjadi media edukasi seperti augmented reality (AR) atau aplikasi berbasis game edukasi.

Kata kunci: Pendidikan Kesehatan Gigi, Media Permainan, Pengetahuan, Puzzle, Qugisaki.

INTRODUCTION

The World Health Organization reports that in 2022 there are around 3.5 billion people worldwide and almost half of the world's population has oral diseases (World Health Organization, 2022). Dental health needs to be a concern for dental health professionals (Moynihan et al., 2018). The results of the 2023 Indonesian Health Survey (SKI) show that the DMF-T index for all age groups has decreased compared to the 2018 Riskesdas results, namely 7.1% to 5.4%. However, dental health in Indonesia needs more serious attention, especially for school-aged children. The age groups 3-4 years, 5 years and 12 years are still in the high and very high DMF-T Index categories (Badan Kebijakan Pembangunan Kesehatan, Kementerian Kesehatan Republik Indonesia, 2023).

The first step as an effort to take care of teeth needs to be increased education about dental health. Providing dental health education to elementary school children is important because at this time they begin to develop habits that usually tend to be permanent until adulthood. One of them is maintaining dental health (Pay et al., 2023). The age of elementary school requires maximum effort in counseling, examination and dental health care by parents, schools and related government agencies involved in school dental health programs (Nordianiwati, & Meysarah, 2020). Education about dental health among elementary school students is an action taken to arouse students' emotions with the aim of eliminating fear or anxiety, increasing curiosity, teaching skills, observing activities that are beneficial to their health, one form of effort in the form of counseling (Wijayanti, 2023)

Learning media in education has a role in motivating learning ability, strengthening memory, increasing interest and making it easier to appreciate (Lima et al., 2024). An effort to change the behavior of dental and oral health of elementary school children is to provide dental health education (Qaera, 2020). Game-based educational media such as puzzles and qugisaki (quartet gigi masa kini) can be used as alternative media for dental health education with interesting, interactive learning methods and fostering children's curiosity, competitive spirit and social spirit (Lisna & Riyaningrum, 2024). The puzzle media applied in dental health education is expected to have a high curiosity so that they immediately find out what the meaning of the random puzzle pieces is. Meanwhile, qugisaki (quartet gigi masa kini) is in the form of a quartet card that contains material in the form of images equipped with descriptions of images and has been previously researched by researchers (Ulliana et al., 2024). Each card has a caption as a form of conveying information to each player. The attractive design on the cards is expected to create an interesting and interactive learning atmosphere, so that participants involved can gain knowledge through these educational games to the maximum (Anggraeni et al., 2022). This study aims to find out the difference in the level of knowledge of grade IV students before and after being given dental health education using the media of puzzle games and qugisaki (Quartet Gigi Masa Kini).

RESEARCH METHODS

This study used an experimental method with a quasi-experimental research design with pre-test and post-test design. The sampling technique used in this study was a total sampling of 64 fourth-grade elementary school students, with inclusion criteria of 10-year-old fourth-grade students who have parental consent and are willing to be respondents. Conversely, the exclusion criteria are uncooperative respondents. Research data collection at SDN Menteng 03 Pagi. The measuring tool used is a questionnaire. Before commencing the research, ethical approval was obtained from the deanship of Scientific Research, Academy of Dental Health, Directorate of Army Health.

The stages of the research implementation are as follows: filling in informed consent, pretest, providing dental health education using game media, namely puzzle and qugisaki media, and post-test. The puzzle game consists of 24 puzzles according to the material that has been designed to be given to students in small groups supervised by researchers and enumerators. Here's how to play the puzzle game consisting of:

1. Students are formed in small groups of 4 students in each group with a circular sitting position
2. Students receive four puzzles with the rest of the puzzles stored in the middle.
3. Students do hompimpa to determine the first player.
4. Students separate the puzzle pieces that are still united. Then students combine the random puzzle pieces and form a puzzle as before.

The game of Qugisaki (quartet gigi masa kini) consists of 24 quartets of which each card measures 8 cm long and 5.5 cm wide. Each category has 4 objects and each object has its own pair and explanation. So 1 card pack consists of 6 categories. How to play qugisaki includes:

1. Quartet card games are conducted in small groups of 4 students/groups. Students sit in a circle.
2. Cards are dealt with each student getting 4 cards each, while the rest of the cards are placed in the middle.
3. After each card, the player performs hompimpa to determine the first player.
4. The first player mentions the desired category, if all players do not have a card then the first player must take 1 card in the middle.
5. Next. The second player mentions the desired category. If another player has the desired category of cards, then that player must take the card in the middle.
6. If the player has collected all the objects in the category, then the player must read the explanation of the card. If you haven't collected all the objects in the category, then the game continues to the next player.
7. The above steps are repeated until all the cards run out and get the category.

This study involved 64 students. Each student will be given a puzzle game intervention and qugisaki (quartet gigi masa kini). The material presented in the dental health education media includes: Dental caries (definition, causes, how to prevent, treatment);

1. Dental persistence (understanding, cause, how to prevent, treatment);
2. Dental calculus (understanding, causes, how to prevent, treatment);
3. Toothbrush (time, stalk shape, toothbrush head, amount of toothpaste);
4. Toothbrushing technique (vertical, horizontal, bass, roll);
5. How to maintain dental health (diligently consume fibrous foods/drinks reduce cariogenic foods/drinks, control teeth at least once every 6 months, drink enough water).

The data obtained was analysed using the Wilcoxon test to determine effectiveness, while the Mann-Whitney test was used to test for differences. This study has also obtained a research permit from the Academy of Dental Health, Directorate of Army Health with number: B/10/I/2024.

RESULTS



Figure 1. Media Qugisaki (Quartet Gigi Masa Kini)

Figure 1 shows the Qugisaki media which is a visual media consisting of cards designed with images.



Figure 2. Media Puzzle

Figure 2 shows a puzzle game consisting of certain picture pieces that can be used to train concentration levels. This study wants to find out the difference in educational knowledge using puzzle and qugisaki game media before and after being treated to students. The difference in results in the treatment was considered as a result of the use of puzzle and qugisaki game media.

Table 1. Results of the difference in pre-test and post-test values for providing dental health education using puzzle media and qugisaki media (quartet gigi masa kini).

Variable	Puzzle	Qugisaki	p-value
Knowledge	Pre-test	Pre-test	0.000
	17.50	16.81	
	(15-20)	(14-19)	
	Post-Test	Post-Test	
	18.34	17.72	
	(16-20)	(16-20)	

Table 1 shows that the p-value is 0.000 (<0.01), meaning that there is a difference in the value before and after the provision of education with the media of puzzle games and qugisaki on the level of knowledge in grade IV elementary school students. The puzzle media obtained a mean value of 17.50 to 18.34. Meanwhile, the Qugisaki media obtained a mean value of 16.81 to 17.72. Providing dental health education using puzzle and qugisaki game media can increase the level of student knowledge.

Table 2. The difference in providing dental health education using puzzle and qugisaki media on student knowledge.

Variable	Group	Mean	p-value
Knowledge	Puzzle	36.95	0.049
	Qugisaki	28.05	

Table 2 based on the analysis of the Man-Whitney test obtained a p-value for the knowledge variable of 0.049 (<0.05), meaning that there was a significant difference between puzzle media and qugisaki media on the improvement of dental health knowledge in students.

DISCUSSION

The results of the study showed that there was a clear difference between the development of puzzles and qugisaki as an educational medium to increase knowledge about students' dental health. The researcher's analysis assumes that the increase in knowledge value is influenced by

the skills and knowledge obtained by respondents who receive the learning method while playing from puzzle media more effectively. The more techniques and skills you have, the more your child's memory will be interested. So that it can improve students' cognition. In addition to cognitive development, the development of play stimulus can satisfy guidance and developmental needs in various dimensions such as motor, creativity, language, emotions, social, values, and life attitudes (Khaerunnisah et al., 2024)

Puzzle learning media is an educational media that challenges children's memory and creativity in learning game forms. The desire of children to continue to try in solving problems makes this game more effective in learning. In addition, the game can be repeated so that it makes the atmosphere fun for children. The constant challenge in this game will encourage the addictive effect to keep trying and trying until it succeeds (Wini, 2021). The use of puzzle media in learning has advantages and disadvantages. The advantages of puzzles are challenging students' creativity, memory and reasoning in solving/solving problems. Meanwhile, the weakness of puzzles is that they emphasize that students must be more visual in their sense of sight, the combination of images that are not appropriate or too complex makes learning less effective and the use of images is less optimal when applied to large groups (Mallombassang et al., 2023).

Research by (Pay et al., 2023) stated that games using educational media in the form of puzzles are effective in increasing children's knowledge levels about dental caries in children at GMIT Baumata Elementary School and SD Negeri 2 Baumata Timur. Puzzle game media such as puzzles show a greater increase in knowledge because it involves a lot of audio and visual senses and involves direct participation to students so that the information obtained is easier to digest (Adeline et al., 2021). The same research by (Ayati & Rachman, 2017) stated that there was a difference in knowledge before and after dental health education was given using the simulation game method (puzzle) regarding brushing teeth to changes in knowledge in grade I students at SDN 005. Another study also states that puzzle game-based educational methods can increase the knowledge of grade 3 and 4 students of SDN 2 Cikidang regarding oral health (Hidayah, 2023).

The use of qugisaki media (quartet gigi masa kini) in the form of quartet cards also has advantages such as being easy to help children understand more quickly and easily remember the content of the message they want to convey because it contains pictures and writing. In addition, it involves a lot of reading and thinking skills for players (Suriah et al., 2024). Literature review has proven that learning by using writing and reading methods is considered to improve a person's ability to remember important information (Hutami et al., 2019). Thus, educational games in the form of qugisaki (quartet gigi masa kini) can be used to support learning, especially in the field of dental health. The results of the study conducted by researchers are in line with previous studies where healthy dental nutrition cards are very feasible to be used to improve health as a parenting pattern to prevent stunting in toddlers (Junaidi et al., 2023).

Previous research by Wicaksono, (2022) stated that Happy Teeth Card as an innovative dental health education media received a positive response from school students and teachers (Wicaksono, Prasida, & Prestiliano 2022). The same study also concluded that the quartet card media can be developed as a dental health education media such as the dental health innovation KARTINI (Kartu Sakti Animation Gigi) which is a dental health learning media during the pandemic which acts as an easy and fun UKGS learning media for students (Suwarjo, 2021). Karin's research (2018) also reported that quartet card media can be developed as a health education medium, especially about dental and oral health (Karin, Pradana, & Abrori 2018). Research on the picture high-hit card game obtained the results of the level of knowledge of elementary school children before the picture high-hit card game was carried out effectively in increasing the knowledge of elementary school students of GMIT Baumata Timur (Pay et al., 2024).

The results of this study obtained a comparison between the provision of dental health education using the media of puzzle games and qugisaki (quartet gigi masa kini) showed a difference. Providing education using puzzle media is more effective because it shows better results compared to the qugisaki game (quartet gigi masa kini) as evidenced by the results of the analysis of the Man-Whitney test.

CONCLUSION

Providing dental health education using puzzle game media is more effective than qugisaki media. Puzzles have a more fun learning process and provide benefits to children to think critically in solving problems through the arrangement of puzzles that are randomly made into complex. thus, the use of puzzle and qugisaki media can be recommended as a tool for dental health education for students because these two media can increase student knowledge.

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