ORIGINAL RESEARCH

PUZZLE AND FLASHCARD EDUCATIONAL MEDIA'S IMPACT ON CHILDREN'S TOOTH ERUPTION KNOWLEDGE

Nendika Dyah Ayu Murika Sari[1*], Sukma Ayu Kinanti[2], Alicia Putri Dhea Fransisca[2], Septriyani Kaswindiarti[1], Nilasary Rochmanita Suparno[1], Dwi Kurniawati[1], Ikmal Hafizi[1], Nida Faradisa Fauziyah[3]

ABSTRACT

Introduction: *The results of the 2018 Basic Health Research (RISKESDAS) survey stated that the prevalence of children's tooth persistence in the mandibula was 66.23%, and in the maxilla, it was 33.77%. The primary factor influencing the process of tooth eruption in children is their attention to dental health. Health promotion using educational game media can improve knowledge about tooth eruption and make it less boring. Educational games for children aged 7–10 years include puzzles and flash cards.* ***Aim:*** *To evaluate the impact of educational media puzzles and flashcards on children's understanding of tooth eruption.* ***Methods****: This type of research is quasi-experimental with a pretest-posttest design. The study was conducted on 97 children aged 7-10 years at SD Muhammadiyah 16 Karangasem, Laweyan, Surakarta. The study began with a pretest. Small groups of 5-7 children and 1 researcher played the game. Each small group was given a puzzle or flashcard media. The game was played every morning for 7 days; on the seventh day, a posttest was conducted.* ***Results:*** *Flashcard pretest scores, flashcard posttest scores, puzzle pretest scores, puzzle posttest scores. Each group's dependent t-test yielded a p-value of 0.000, while the independent t-test yielded p-values of 0.099 and 0.115.* ***Conclusion:*** *Flashcards and puzzle educational media are each effective in increasing children's knowledge about tooth eruption, but there is no significant difference when the two are compared.*

Keywords*: flashcards; puzzle; tooth eruption*

[1]Faculty of Dentistry, Universitas Muhammadiyah Surakarta,
[2]Undergraduate Student, Faculty of Dentistry, Universitas Muhammadiyah Surakarta
[3]Faculty of Medicine, Universitas Muhammadiyah Surakarta
corresponding author: nendika.dyahayu@ums.ac.id

INTRODUCTION

Dental and oral health is an inseparable part of body health because it can affect the overall balance of the body.[1] Dental and oral health problems still require significant attention in Indonesia. Caries and tooth persistence are two of the dental and oral health problems that often occur in children.[2] The results of the 2018 Basic Health Research (RISKESDAS) survey proved that the prevalence of caries in children aged 5–6 years was 93%, while other studies stated that the prevalence in the mandible was 66.23% and in the maxilla was 33.77% for cases of tooth persistence.[3,4]

The most common reason for cases of tooth persistence is due to a lack of parental

knowledge so that children do not understand the process of tooth replacement. Children's attention to their dental health is the main factor that influences the process of tooth replacement in children.[5] Knowledge about dental and oral care that is still lacking can be improved through health promotion.[6] One type of health promotion in children is by using educational game media. Educational games for children are designed using puzzle and Flashcard media.[7,8]

Puzzle media divides an image into several pieces to sharpen the brain, train eye and hand coordination, train reasoning, and train patience.[7] Games related to lessons, such as the use of puzzle media, can create a comfortable learning atmosphere.[9] Puzzle media is an effective learning medium for elementary school children, particularly those aged 8-10 years.[10] The advantages of puzzle media are that they can attract children's interest in learning, overcome limitations of space and time, and increase insight and skills. Puzzle media is a valuable tool for enhancing children's knowledge levels as a learning medium.[11] In addition to puzzle media, entertainment that children also like is flashcard media.

Flashcard media used in learning can improve children's mindset towards something being observed and children will more easily understand the material given. Based on the results of research showed that there was an increase in children's knowledge ability by using flashcard learning media. Learning using flashcard media can also help provide motivation and increase children's enthusiasm for learning, Children can play while learning so that learning is not boring.[12]

SD Muhammadiyah 16 Karangasem, Surakarta, is one of the elementary school (SD) education units under the auspices of the Ministry of Education and Culture. SD Muhammadiyah 16 Karangasem, Surakarta, has received counselling on how to maintain and improve dental and oral hygiene by the School Dental Health Service (UKGS), such as brushing teeth properly and correctly. Knowledge about permanent tooth eruption has not been explained further. The purpose of this study was to determine the effectiveness of using educational media puzzles and flashcards (Figure 2) on the level of children's knowledge about tooth eruption.

METHODS

This research has obtained approval from the health research ethics commission of Dr. Moewardi Hospital, Surakarta with the Ethical Clearance number 2.115/XI/HREC/2023. This type of research is quasi-experimental with a pretest-posttest design.

The research was conducted at Muhammadiyah Elementary School 16 Karangasem, Laweyan, Surakarta in February – March 2024. The subjects of this study were students of Muhammadiyah Elementary School 16 Karangasem, Laweyan, Surakarta aged 7-10 years. The number of samples used in this study was 97 students.

The study began by working on a pretest of 10 multiple-choice questions. The pretest was carried out for 15 minutes. The researcher divided the students into two large groups, namely the puzzle group and the flashcard group. Each large group consisted of one class. One

researcher accompanied each small group of 5-7 students.

Before starting the game, the researcher provided an initial explanation of how to play it. The rules of the puzzle media game (figure 1) are to divide the puzzle media into each group. The researcher showed the initial puzzle and then scrambled the puzzle pieces so that they were irregular. The arrangement of the puzzle pieces was carried out by the respondents and accompanied by a discussion of the material in the puzzle until it was neatly arranged.

Figure 1. The puzzle media example used

The rules of the flashcard media game (figure 2) are to divide one pack of flashcards and then open them alternately. The participants guess the questions on the cards and then open the answers on the back. The researcher guided this game. The activity was carried out repeatedly for one week. On the seventh day, respondents worked on a posttest of 10 multiple-choice questions.

The data was tested statistically twice. The first statistical test was the dependent T-Test to determine the effectiveness of using each media. The data tested were the pretest data compared with the posttest data of each medium. The second statistical test was the Independent T-test to determine the comparison of the effectiveness of the two media. The data tested were the difference between the pretest and posttest data of the puzzle medium and the flashcard media.

Figure 2. The flashcard media example used

RESULTS

The measurement of pretest and posttest values used a questionnaire consisting of 10 multiple-choice questions. The questionnaire was distributed to respondents before starting the study and after the study was completed. The average pretest and posttest values of the flashcard and puzzle media groups are as shown in Table 1.

Table 1. Average pretest, posttest, and difference values between pretest and posttest in the flashcard and puzzle media groups.

Media	Pretest	Posttest	Difference
Flashcard	$59,35 \pm 1,18$	$91,09 \pm 1,21$	$35,65 \pm 2,4$
Puzzle	$52,17 \pm 2,86$	$87,61 \pm 1,36$	$31,57 \pm 0,86$

The value data and the difference in values of each group were tested for normality. The paired t-test using IBM SPSS Statistics 25 software was conducted to determine the significance of the differences in pretest and

posttest values in each group. The results of the paired t-test are presented in Table 2.

Table 2. Paired t-test results of pretest-posttest values in the flashcard media group and the puzzle media group

Paired Samples Test				
		t	df	Sig. (2-tailed)
Pair 1	Posttest Flashcard - Pretest Flashcard	36.820	50	.000
Pair 2	Posttest Puzzle - Pretest Puzzle	14.878	45	.000

Based on Table 2, the flashcard media group and the puzzle media group both have a p-value of 0.000. Both groups have significant differences in pretest and post-test values. The results of this study indicate that respondents have increased values from before the study to after the study. Flashcard media and puzzle media are effective in increasing respondents' knowledge about tooth eruption.

Table 3. Independent t-test results of the difference between pretest and post-test in the flashcard media group and the puzzle media group

Independent Samples Test					
				95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Lower	Upper
Value Equal variances assumed	-1.666	95	.099	-8.950	.783
Equal variances not assumed	-1.602	56.386	.115	-9.190	1.022

To find out which medium is more effective in increasing knowledge, the test was continued with an independent t-test. This test utilized the difference between the pretest and posttest scores of the flashcard media group and the puzzle media group. The independent t-test results are presented in Table 3. Table 3 shows a p-value of > 0.05, indicating no significant difference in pretest and posttest scores between the flashcard and puzzle media groups.

DISCUSSION

The use of flashcards and puzzle media in this study aims to improve children's knowledge about tooth eruption. Based on the results of this study, there was a significant difference (p < 0.05) in the dependent t-test for the pretest and posttest values of the flashcard media group. Flashcards, which take the form of picture cards, serve as one type of learning media. Each image on the flashcard conveys a series of messages, and the back of the card lists a description for each image. The use of images as media can facilitate students' observation and understanding of the material. The use of this flashcard media can enhance children's understanding by sharpening their right brain's memory for images and words, which are the main components of flashcard learning media.[13] Flashcard media used to educate elementary school children about tooth eruption has proven effective.[4] Flashcard media, as a learning medium, offers the advantages of being engaging, practical, and utilizing the concept of guessing. Flashcard media can train children's memory and make it easier for children to remember the material on the card.[14]

Based on this study, the puzzle media group also had a significant difference (p < 0.05) in the dependent t-test for pretest and posttest values. Similar to flashcard media, puzzle media also features attractive images and colors, facilitating students' comprehension of the material. The preparation of this puzzle media is very beneficial for children as it can sharpen their brains and enhance their ability to collaborate effectively. Children's understanding of learning

16

materials will be easier to digest when combined with a game.[15]

Edgar Dale's "Cone of Experience" suggests that students' memory improves by 10% when they read from printed media, 20% when they hear from audio media, 30% when they see from visual media, and 70% when they demonstrate and do something.[16] Flashcards and puzzle media are examples of visual printed media, as they include reading activities that can enhance students' knowledge by 10%, visual media such as interesting puzzle images and colors that can increase knowledge by 30%, and activities such as working on puzzles and guessing questions on flashcards that can enhance students' knowledge by 70%.[17]

Respondents in this study were children aged 7-10 years. Children between the ages of 8 and 10 years exhibit rapid memory development. Children also demonstrate independence and a sense of self-responsibility, enabling them to collaborate in the completion of tasks.[18,19] The possession of intellectual intelligence can foster reasoning and creativity in school-age children. Elementary school-aged children enhance their ability to socialize with their peers, enabling them to complete tasks in groups.[20] Children aged 9-11 years begin to have curiosity, begin to understand what is being conveyed, and have begun to be active in thinking so that children are able to understand the material contained in flashcards and puzzle media.[21]

This study found that the differences in pretest and post-test scores in both groups did not significantly differ (p > 0.05) from the results of the independent t-test. Flashcard media and puzzle media are equally effective in increasing children's knowledge about tooth eruption. The use of these two media enhances the learning atmosphere by allowing children to simultaneously play and learn, thereby preventing boredom and facilitating a more readily understood understanding of the material.[14] Using flashcard media in learning makes children active in trying to obtain information about the material. Learning using media is also an important factor in increasing children's knowledge. Children's enthusiasm for completing puzzles in groups increases their motivation to complete challenges quickly.[22]

CONCLUSION

Flashcards and puzzle educational media are each effective in increasing children's knowledge about tooth eruption, but there is no difference when the two are compared.

ACKNOWLEDGEMENT

REFERENCES

1. Budiwibowo A, Riana S, Uprianingsih A. Pengaruh Pemberian Pendidikan Kesehatan Dengan Metode Story Telling Terhadap Tingkat Pengetahuan Kebersihan Gigi Pada Anak Usia Sekolah di SDN Inpres Kala Tahun 2019. Gravity Edu (J Pendidik Fis). 2019;2(2):16–8.
2. Husna N, Prasko P. Efektivitas Penyuluhan Kesehatan Gigi Dengan Menggunakan Media Busy Book Terhadap Tingkat Pengetahuan Kesehatan Gigi Dan Mulut. J Kesehat Gigi. 2019;6(1):51.
3. Kemenkes RI. Laporan Riskesdas 2018 Kementrian Kesehatan Republik Indonesia [Internet]. Vol. 53, Laporan Nasional Riskesdas 2018. 2018. p. 154–65. Available from: http://www.yankes.kemkes.go.id/assets/downloads/PMK No. 57 Tahun 2013 tentang PTRM.pdf
4. Sari NDAM, Christiono S, Fitriani SR, Julian IT.

Improving Children ' s Knowledge About When Teeth Erupt with The Use of Flashcards. GANDRUNG J Pengabdi Kpd Masy. 2023;4(2):1008–16.

5. Amila, Hasibuan EK. Peningkatan Pengetahuan Anak Usia Dini. J Abdimas Mutiara. 2020;1:1.

6. Calderón Larrañaga S, Expósito Ruiz M, Cruz Vela P, Cuadrado Conde A, Alquézar Villarroya L, Garach Gómez A, et al. Primary Care and oral health promotion: Assessment of an educational intervention in school children. Aten Primaria. 2019;51(7):416–23.

7. Khomsoh R, Gregorius J. Penggunaan Media Puzzle untuk Meningkatkan Hasil Belajar. Surabaya; 2013 Jun.

8. Aisyah N, Ridwan R, Huda H, Faisol W, Muawanah H. Effectiveness of Flash Card Media To Improve Early Childhood Hijaiyah Letter Recognition. J Obs J Pendidik Anak Usia Dini. 2022;6(4):3537–45.

9. Hutami AR, Dewi NM, Setiawan NR, Putri NAP, Kaswindarti S. Penerapan Permainan Molegi (Monopoli Puzzle Kesehatan Gigi) Sebagai Media Edukasi Kesehatan Gigi Dan Mulut Siswa Sd Negeri 1 Bumi. J Pemberdaya Masy Univ Al Azhar Indones. 2019;1(2):72.

10. Maelissa SR, Ukru RY. Pendidikan Kesehatan Dengan Media Puzzle Efektif Meningkatkan Perilaku Hand Higyene Pada Anak Usia Sekolah. Maluku; 2020 May.

11. Arifuddin A, Maufur S, Farida F. Pengaruh Penerapan Alat Peraga Puzzle dengan Menggunakan Metode Demonstrasi Terhadap Motivasi Belajar Siswa Pada Pembelajaran Matematika di SD/MI. J Ilm Sekol Dasar. 2018;2(1):10.

12. Wahyuni S. Penerapan Media Flash Card untuk Meningkatkan Hasil Belajar Tema "Kegiatanku." J Ilm Sekol Dasar. 2020;4(1):9.

13. Saputri SW. Pengenalan Flashcard sebagai Media untuk Meningkatkan Kemampuan Bahasa Inggris. ABDIKARYA J Pengabdi dan Pemberdaya Masy. 2020;2(1):56–61.

14. Magdalena I, Fatakhatus Shodikoh A, Pebrianti AR, Jannah AW, Susilawati I, Tangerang UM. Pentingnya Media Pembelajaran untuk Meningkatkan Minat Belajar Siswa SDN Meruya Selatan 06 Pagi. Ed J Edukasi dan Sains [Internet]. 2021;3(2):312–25. Available from: https://ejournal.stitpn.ac.id/index.php/edisi

15. Agripina CA, Cholifah TN. Pengembangan Media Puzzle Pancasila (Puzzpala) Untuk Meningkatkan Hasil Belajar Siswa Kelas 2 Sekolah Dasar. J Pendidik Dasar Perkhasa J Penelit Pendidik Dasar. 2020;6(2):195–208.

16. Rochmata CS, Amalia ANA, Zaid AH bin, Yusron MA, Liputo SK. The Analysis of Experiential Learning Method of Dale's Cone Experience Model in Improving the Effectiveness of Arabic Language Learning. Izdihar J Arab Lang Teaching, Linguist Lit. 2024;7(1):25–40.

17. Hasnah A, Dwi Kurniawati, Riolina A, Sari NDAM. Peningkatan Pengetahuan Kesehatan Gigi Dan Mulut Anak Sekolah Dasar Dengan Penyuluhan Menggunakan Media Dento Board Game. J Pengabdi Masy Med. 2023;11–5.

18. Sandya IW, Widati S. the Difference of Effectiveness of Animated and Non-Animated Movies on the Improvement of Children'S Knowledge and Attitudes About Dental Health. Indones J Public Heal. 2019;14(1):60–8.

19. Kurniawati D, Cahyaningrum DA. Knowledge, Attitude and Practice Mengenai Kesehatan Gigi Dan Mulut Mahasiswa S1 Universitas Muhammadiyah Surakarta. JIKG (Jurnal Ilmu Kedokt Gigi). 2022;5(2):1–8.

20. Mia. Pendidikan Islam dan Keagamaan Karakteristik Perkembangan Peserta Didik. J Kaji Pendidik Islam dan keagamaan [Internet]. 2022;6(4):351–71. Available from: http://jurnal.uinsu.ac.id/index.php/eduriligia/index

21. Durrotunnisa D, Hanita RN. Konseling Kelompok Teknik Reinforcement Positif untuk Meningkatkan Motivasi Belajar Siswa Broken Home. J Basicedu. 2021;6(1):315–23.

22. Noviati PR. Penerapan Media Puzzle dalam Meningkatkan Hasil Belajar IPS Pada Siswa Kelas III SDN 2 Paseh Kecamatan Paseh Kabupaten Sumedang. Golden Age J Pendidik Anak Usia Dini. 2017;1(1):47–57.