



The Effect of Web-Based Puzzle Media on Enhancing Arabic Reading Comprehension among Students at Madrasah Tsanawiyah

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Abstract:

Improving students' reading comprehension in Arabic is essential for supporting religious literacy and academic success in Islamic educational contexts. This study investigates the effectiveness of web-based puzzle media in enhancing the Arabic reading comprehension of eighth-grade students at MTs Nurul Ikhsan Cirebon. Employing a quantitative experimental approach with a one-group pretest-posttest design, the research examines how digital puzzle-based activities can foster learner engagement and comprehension. The media was implemented through interactive web tools that required students to reconstruct text content using images and sentences derived from learning materials. Statistical analysis using the paired sample t-test revealed a significant improvement in student performance, with a t-value of 14.9 exceeding the critical t-table value of 2.084 at the 0.05 significance level. The mean score increased from 43.84 (pretest) to 79.17 (posttest), indicating a gain of 35.33 points. These results demonstrate that web-based puzzle media can serve as an effective, engaging, and pedagogically sound tool for improving Arabic reading comprehension in the digital learning era.

Keywords: *Arabic Reading Comprehension, Web-Based Puzzle Media, Digital Learning, Interactive Instruction, Islamic Education*

Abstrak:

Meningkatkan pemahaman bacaan siswa dalam bahasa Arab sangat penting untuk mendukung literasi agama dan keberhasilan akademis dalam konteks pendidikan Islam. Penelitian ini menyelidiki efektivitas media teka-teki berbasis web dalam meningkatkan pemahaman bacaan bahasa Arab siswa kelas delapan di MTs Nurul Ikhsan Cirebon. Dengan menggunakan pendekatan eksperimental kuantitatif dengan desain pretest-posttest satu kelompok, penelitian ini meneliti bagaimana aktivitas berbasis teka-teki digital dapat mendorong keterlibatan dan pemahaman pelajar. Media diimplementasikan melalui alat web interaktif yang mengharuskan siswa untuk merekonstruksi konten teks menggunakan gambar dan kalimat yang berasal dari materi pembelajaran. Analisis statistik menggunakan uji-t sampel berpasangan mengungkapkan peningkatan yang signifikan dalam kinerja siswa, dengan nilai-t 14,9 melebihi nilai t-tabel kritis 2,084 pada tingkat signifikansi 0,05. Skor rata-rata meningkat dari 43,84 (pretest) menjadi 79,17 (posttest), menunjukkan peningkatan 35,33 poin. Hasil-hasil ini menunjukkan bahwa media teka-teki berbasis web dapat berfungsi sebagai alat yang efektif, menarik, dan secara pedagogis baik untuk meningkatkan pemahaman membaca bahasa Arab di era pembelajaran digital.

Kata Kunci: *Pemahaman Membaca Bahasa Arab, Media Teka-teki Berbasis Web, Pembelajaran Digital, Pembelajaran Interaktif, Pendidikan Islam*

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INTRODUCTION / المقدمة

Reading comprehension is a fundamental skill in language acquisition, especially in Arabic, which holds a central position in Islamic education. Mastery of Arabic reading not only facilitates access to linguistic knowledge but also plays a crucial role in understanding primary Islamic sources such as the Qur'an, Hadith, and classical texts (da Silva Costa et al., 2022; Guy, 2024; Teixeira da Silva et al., 2024). In Madrasah Tsanawiyah, where Arabic is a core subject, reading comprehension is not merely a technical skill but a gateway to religious literacy and deeper intellectual engagement (Tarigan & Ahkas, 2023). However, instructional challenges persist, particularly due to traditional teaching methods that often fail to engage students in meaningful and interactive ways.

Many Arabic teachers still rely heavily on lecture-based and text-oriented approaches that do not foster active participation or accommodate diverse learning styles (Li et al., 2021; Öztürk & Özacar, 2020). This conventional practice often results in decreased student motivation and limited comprehension outcomes, especially among junior high school learners (De Souza & Kasseboehmer, 2022; Khalil & Pipa, 2022; Kittur & Islam, 2021). In response to these pedagogical limitations, educational innovations are increasingly called for ones that integrate student-centered strategies and leverage technology to support comprehension processes (Lee et al., 2022; Rolfe et al., 2021). In this regard, interactive media, particularly digital game-based learning tools, offer promising pathways to enhance reading instruction in Arabic.

Web-based Puzzle media is one such innovation that blends educational content with interactive gameplay, allowing students to engage in cognitive problem-solving while reinforcing their understanding of text (Aziz & Sain, 2025; Setiawan Putri et al., 2024). As a technology-enhanced learning tool, Puzzle media encourages motivation, attention, and retention through dynamic engagement. This approach aligns with contemporary theories of learning that emphasize the importance of multisensory stimulation and meaningful interaction with content, particularly for language comprehension skills (Paruli et al., 2023; Wang, 2023). Within the context of Islamic schools, the application of web-based learning tools can be tailored to uphold religious values while modernizing instructional delivery.

Despite the documented benefits of digital learning media, few studies have explored their application in the context of Arabic reading instruction at the Madrasah Tsanawiyah level. Most existing research addresses digital tools in general language learning or fails to consider the specific needs and contexts of Islamic-based education (Abdullah, 2024; Bali & Heru, 2024; Nisa' & R, 2024). This study seeks to address that gap by investigating the effect of Web-based Puzzle media on improving Arabic reading comprehension among eighth-grade students at MTs Nurul Ikhsan Cirebon. Using a pretest-posttest design, the study aims to assess the media's effectiveness in enhancing students' cognitive engagement and comprehension outcomes.

This research is based on the premise that effective reading instruction in Arabic requires more than conventional pedagogy; it demands the integration of relevant, interactive, and context-sensitive digital tools. By incorporating Puzzle media into Arabic learning in a madrasah setting, the study offers a practical model for improving student outcomes while respecting the religious ethos of Islamic education. The originality of this study lies in its focus on bridging the digital innovation gap in Islamic schools, presenting a

solution that is pedagogically sound, technologically updated, and culturally grounded.

RESEARCH METHOD / المنهجية

This study employs an experimental method. An experimental research method is defined as a method used to investigate the effect of a specific treatment on another variable under controlled conditions (Jääskä et al., 2023; Zheng & Wu, 2021). The research design adopted is the One Group Pretest-Posttest Design, which is used to determine the effect of a treatment or intervention on the dependent variable by measuring values before and after the treatment. This allows for more accurate results by comparing the state before the treatment. The rationale for selecting this method is to obtain accurate results through multiple tests, specifically a pretest (before treatment) and a posttest (after treatment). The research design is illustrated as follows:

Tabel.1 Research Design

Research Design		
Pretest	Treatment	Posttest
O ₁	X	O ₂

Keterangan:

O₁ = Pretest Score (before treatment)

X = Treatment (implementation of web-based Puzzle media)

O₂ = Posstest Score (after treatment)

The population of this study consists of all students at MTs Nurul Ikhsan Cirebon. The sampling technique used is purposive sampling, which involves selecting samples based on specific criteria that align with the research objectives (Sugiyono, 2017). The sample size is 29 students. The research instrument is a multiple-choice test consisting of 10 questions on the theme "الهواية" (Hobbies), administered during the pretest and posttest. This research was carried out in three stages, namely the planning stage, the implementation stage, and the post-implementation stage. The Preparation Stage includes 1) Problem identification: Determine the background of the importance of web-based Puzzle media in learning Arabic. 2) Formulate research objectives: Measure the influence of web-based puzzle media on students' Arabic reading comprehension. 3) Develop research instruments: Create test questions to measure students' reading ability before and after the treatment and test the validity and reliability of the instrument. 4) Determining the research sample: Selecting students of grade VIII MTs Nurul Ikhsan Cirebon by purposive sampling.

The Implementation Stage includes; 1) Conduct a pretest: Measure students' initial abilities before using web-based Puzzle media. 2) Treatment: a) Using web-based puzzle media in the process of learning to read Arabic. b) Students are invited to practice understanding the text through interactive activities based on Puzzles. c) Conducted during several learning sessions according to the schedule. 3) Conduct a posttest: Measure students' reading ability after using web-based Puzzle media. The Implementation Stage includes; 1) Conduct a pretest: Measure students' initial abilities before using web-based Puzzle media. 2) Treatment: a) Using web-based puzzle media in the process of learning to read Arabic. b) Students are invited to practice understanding the text through interactive

activities based on Puzzles. c) Conducted during several learning sessions according to the schedule. 3) Conduct a posttest: Measure students' reading ability after using web-based Puzzle media.

FINDINGS AND DISCUSSION / نتائج البحث و المناقشة

Findings

Improvement in Arabic Reading Comprehension through Web-Based Puzzle Media

The results of the normality and homogeneity tests indicate that the data meet the assumptions required for parametric analysis. As shown in next explanation, the Shapiro-Wilk test yielded significance values of 0.130 for the pretest and 0.102 for the posttest, both of which are greater than 0.05. This confirms that the distribution of the data is normal. Similarly, Table 3 shows a significance value of 0.818 in the homogeneity test, which is also greater than 0.05, indicating that the data variance is homogeneous. These results affirm that the dataset fulfills the necessary conditions for further hypothesis testing using a paired sample t-test to evaluate the effectiveness of the web-based puzzle media on Arabic reading comprehension.

Thus presents the pretest and posttest scores of 29 students along with the gain scores and squared deviations. The total sum of squared deviations ($\sum X^2d$) is 2186.2. Based on the computed values, the mean difference (Md) between pretest and posttest scores was calculated, followed by the t-value, which resulted in 12.6. Compared to the critical t-table value of 2.048 at $\alpha = 0.05$ and $df = 28$, the calculated t-value exceeds the threshold ($12.6 > 2.048$). Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a) is accepted. This means there is a statistically significant difference between the students' pretest and posttest scores, indicating that the use of web-based puzzle media had a significant positive effect on enhancing students' Arabic reading comprehension skills. The research results can be seen in the following table:

Tabel.2.
Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest	.164	29	.045	.944	29	.130
posttest	.156	29	.070	.940	29	.102

a. Lilliefors Significance Correction

Based on Table 2, the Shapiro-Wilk test results show that the significance values for the pretest and posttest are $0.130 > 0.05$ and $0.102 > 0.05$, respectively. Therefore, it can be concluded that the data are normally distributed.

Tabel.3.

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
hasil	Based on Mean	.053	1	56	.818
	Based on Median	.073	1	56	.787
	Based on Median and with adjusted df	.073	1	54.416	.787
	Based on trimmed mean	.051	1	56	.823

Based on Table 3, the significance value obtained is $0.818 > 0.05$. Therefore, it can be concluded that the data come from a homogeneous population or that the data variance is homogeneous.

Tabel.4.

Siswa	Pretest (X)	Protest (Y)	Gain (D) (X-Y)	$Xd=(d-Md)$	X^2d
1	60	80	20	-0,7	0,5
2	30	60	30	9,3	86,7
3	40	60	20	-0,7	0,5
4	30	50	20	-0,7	0,5
5	40	70	30	9,3	86,7
6	50	70	20	-0,7	0,5
7	40	70	30	9,3	86,7
8	20	50	30	9,3	86,7
9	50	60	10	-10,7	114,3
10	10	40	30	9,3	86,7
11	40	50	10	-10,7	114,3
12	30	50	20	-0,7	0,5
13	50	60	10	-10,7	114,3
14	40	50	10	-10,7	114,3
15	30	40	10	-10,7	114,3
16	50	60	10	-10,7	114,3
17	50	80	30	9,3	86,7
18	40	70	30	9,3	86,7
19	60	80	20	-0,7	0,5
20	70	80	10	-10,7	114,3
21	20	30	10	-10,7	114,3
22	70	80	10	-10,7	114,3
23	50	60	10	-10,7	114,3
24	10	40	30	9,3	86,7
25	50	80	30	9,3	86,7
26	50	80	30	9,3	86,7
27	70	90	20	-0,7	0,5
28	40	70	30	9,3	86,7
29	40	70	30	9,3	86,7

Jumlah	600	2186,2
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Finding the Md Value:

$$Md = \frac{\sum d}{n} = \frac{600}{29} = 20,7$$

Fiding the t-Value:

$$t = \frac{Md}{\sqrt{\frac{\sum x^2 d}{N(N-1)}}} = \frac{20,7}{\sqrt{\frac{2186,2}{29(29-1)}}} = \frac{20,7}{1,64} = 12,6$$

MD = Calculate the average difference between pre-test and post-test results

X1 = Learning outcomes before treatment (pre-test)

X2 = Learning outcomes after treatment (post-test)

D = Deviation of each subject

$\sum x^2 d$ = Sum of squared deviations

Hypothesis Testing Criteria:

- Reject H_0 if t-calculated > t-table
- Accept H_0 if t-calculated < t-table

t-table value:

$\alpha = 0.05$ and $df = n - 1 = 29 - 1 = 28$

t-table = 2.048

Since $12.6 > 2.052$ or t-calculated > t-table, H_0 is rejected and H_a is accepted, meaning there is a significant difference in the average scores between the pre-test and post-test. Based on the quantitative data obtained from the evaluation results, the data were used to assess the impact of web-based puzzle media on students' reading skills.

The Impact of Web-Based Puzzle Media on Students' Reading Performance

The steps for learning using web-based puzzle media include selecting a website through Google, where several educational media websites serve as learning intermediaries. The sentences and images chosen must be related to the material in the textbook. Next, students arrange the images and sentences into a puzzle, ensuring the correct use of Arabic vocabulary. They then select the number of puzzle pieces horizontally and vertically. At this stage, the web-based image puzzle media is created. Students are given 20 minutes to complete 10 questions. By using puzzle media, students are trained to think creatively, solve problems, and learn while playing (Saputra & Selviana, 2021).

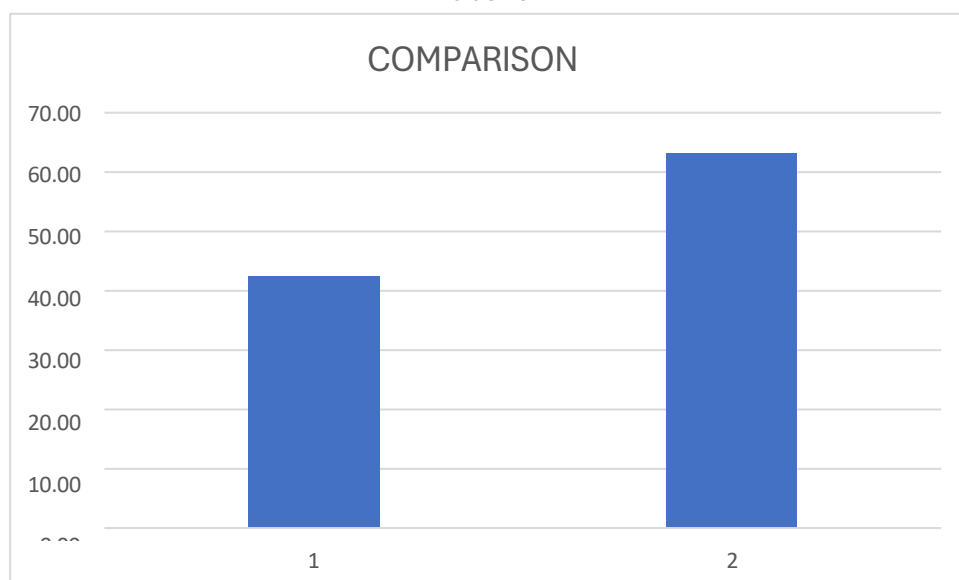
Tabel.5.

Exam	Average Score
Pretest	42,41
Posttest	63,10
Improvement (%)	20,69 %

Based on the quantitative research conducted, Table 5 shows that the average pretest score is 42.41, while the average posttest score is 63.10. These results indicate an

improvement in students' reading comprehension before and after implementing the window shopping learning model, with an increase of 20.69%. Data analysis using the t-test shows that the calculated t-value (t-calculated) is 57.1, while the t-table value is 2.052. Since $t\text{-calculated} > t\text{-table}$ ($12.6 > 2.048$), H_a is accepted. This result indicates that students' reading comprehension improved after applying the window shopping learning model. The t-test was conducted with $df = N - 1 = 29 - 1 = 28$ at a significance level of 0.05, resulting in a t-table value of 2.048.

Tabel.6



Learning with web-based puzzle media can improve students' reading comprehension in Arabic subjects on the topic of *mihnah* (*maharah qira'ah*). Thus, the research hypothesis stating that learning with web-based puzzle media can enhance students' reading comprehension in Grade VIII at MTs Nurul Ikhsan Cirebon is accepted.

Discussion

The findings of this study provide strong evidence that web-based puzzle media significantly improves students' Arabic reading comprehension at the Madrasah Tsanawiyah level. The statistical analysis revealed that the data met all parametric assumptions, including normality and homogeneity, which validate the reliability of the t-test employed. The calculated t-value of 12.6 was substantially higher than the critical t-table value of 2.048 at a 5% significance level ($df = 28$), leading to the rejection of the null hypothesis and the acceptance of the alternative hypothesis. This confirms that the integration of web-based puzzle media contributed meaningfully to students' posttest performance (Humphreys, 2020; Tlali & Lefoka, 2023). The average student score improved from 42.41 in the pretest to 63.10 in the posttest, indicating a gain of 20.69%. This increase is not only statistically significant but also educationally meaningful, reflecting improved comprehension and engagement with the Arabic reading material.

The effectiveness of the web-based puzzle media can be attributed to its interactive and student-centered nature, which aligns with cognitive and constructivist learning theories (Hu et al., 2023; Munawwaroh, 2024; Umar & Khaer, 2024). The puzzle format

requires students to engage with Arabic vocabulary and sentence structures actively, while also enhancing their problem-solving and critical thinking skills. According to Feng & Feng (2020), puzzle-based learning fosters an enjoyable and immersive environment that motivates students to participate more fully in learning activities. The integration of visual stimuli, timed challenges, and contextualized language tasks likely helped students internalize vocabulary and meaning more effectively (Flora et al., 2020). Furthermore, this mode of learning supports differentiated instruction, allowing students with varying proficiency levels to benefit from customized pacing and repeated exposure to the material.

These findings are consistent with previous research emphasizing the value of digital and game-based learning media in second language acquisition. Studies such as those by Sung (2021) highlight that technology-enhanced learning tools not only boost student motivation but also facilitate deeper cognitive processing of texts. In the context of Islamic-based education, the use of web-based media like puzzles also offers the flexibility to embed moral and religious themes into language tasks, enhancing both linguistic and spiritual learning outcomes (Smith et al., 2020; Zou et al., 2024). This suggests that the integration of culturally responsive, interactive digital media in Arabic instruction holds promising implications for curriculum innovation in madrasah settings. Future studies could expand on this model by exploring long-term retention effects or by applying the media across other Arabic language skills such as listening or writing.

The implications of using web-based puzzle media in Arabic language learning extend beyond immediate score improvements. This approach cultivates higher-order thinking skills, such as pattern recognition, deductive reasoning, and semantic association, which are essential for meaningful text interpretation. Moreover, the gamified nature of the media fosters a learner-centered atmosphere where students are encouraged to take initiative and become active participants in their own learning process. In line with Vygotsky's theory of social constructivism, the interactive and problem-solving tasks embedded in the puzzle activities promote both individual reflection and collaborative knowledge construction. These dynamics not only enhance comprehension but also nurture critical language awareness, a skill crucial for understanding more complex Arabic texts in later stages of education.

In sum, the findings affirm that integrating web-based puzzle media into Arabic reading instruction provides a practical, engaging, and cognitively rich learning environment, especially within the context of Islamic secondary education. This study contributes to the expanding discourse on technology-enhanced language learning by offering a culturally relevant and pedagogically innovative model that supports comprehension while aligning with the digital preferences of today's learners. As Arabic instruction in madrasah settings increasingly intersects with 21st-century learning demands, such innovations become vital. Future research should investigate the long-term retention effects of puzzle-based reading activities and explore their applicability across diverse linguistic skills and educational contexts.

CONCLUSION / الخلاصة

The use of web-based puzzle media has proven to be effective in improving Arabic reading comprehension among eighth-grade students at MTs Nurul Ikhsan Cirebon. This media makes the learning process more engaging and interactive, thereby increasing

students' interest and motivation to learn. This approach not only helps students better understand the material but also encourages the integration of technology into language learning. Several recommendations can be made based on this study. First, students should practice regularly to enhance their Arabic reading skills. Second, teachers should continuously evaluate and monitor students' progress while providing feedback and motivation. Third, schools should provide technological facilities such as computers or internet access to support the use of web-based learning media and promote the implementation of interactive media, such as web-based puzzles, in various subjects to enhance students' engagement and comprehension. It is also the researcher's responsibility to continuously improve the quality and effectiveness of this journal. There are still many shortcomings in this study, and the researcher welcomes feedback from readers.

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