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ENHANCING ARABIC VOCABULARY MASTERY THROUGH VIRTUAL TOUR MEDIA: A QUASI-EXPERIMENTAL STUDY AT AN INTEGRATED ISLAMIC ELEMENTARY SCHOOL

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Abstract

Arabic vocabulary (mufrodat) is a foundational element in mastering the Arabic language, especially for elementary students in Islamic education. However, conventional teaching methods and limited media often hinder student engagement and vocabulary retention. This study aimed to evaluate the effectiveness of Virtual Tour–based interactive media in improving students' Arabic vocabulary mastery. The research employed a quasi-experimental one-group pretest-posttest design involving 28 fifth-grade students at an Integrated Islamic Elementary School in Yogyakarta. Research instruments included classroom observations, teacher interviews, a student motivation questionnaire (10 valid and reliable items), and a vocabulary test (15 valid and reliable items). The results indicated an increase in mean scores from 48.18 to 72.39. The Wilcoxon signed-rank test yielded $Z = -3.888$ with $p < 0.001$, indicating a statistically significant improvement. The mean N-Gain score was 0.48, classified as a moderate improvement. All questionnaire items scored above 4.0 on a five-point Likert scale, with an overall mean of 4.37, categorized as very good. These findings suggest that Virtual Tour media can effectively enhance motivation, interaction, and contextual vocabulary acquisition. The study contributes to the development of digital media in Arabic language education and offers an innovative alternative for Arabic teachers at the elementary level.

Keywords: *Arabic Vocabulary, Virtual Tour, Interactive Learning Media,, Educational Technology.*

Abstrak

Kosakata Arab *(mufrodat)* merupakan elemen dasar dalam penguasaan bahasa Arab, khususnya bagi siswa sekolah dasar dalam pendidikan Islam. Namun, metode pembelajaran konvensional dan keterbatasan media sering kali menghambat keterlibatan siswa dan daya ingat kosakata. Penelitian ini bertujuan untuk mengevaluasi efektivitas media interaktif berbasis Virtual Tour dalam meningkatkan penguasaan kosakata Arab siswa. Penelitian menggunakan desain kuasi-eksperimen dengan model *one-group pretest–posttest* yang melibatkan 28 siswa kelas V di sebuah Sekolah Dasar Islam Terpadu di Yogyakarta. Instrumen penelitian meliputi observasi kelas, wawancara guru, angket motivasi siswa (10 butir valid dan reliabel), serta tes kosakata (15 butir valid dan reliabel). Hasil penelitian menunjukkan peningkatan skor rata-rata dari 48,18 menjadi 72,39. Uji Wilcoxon menghasilkan nilai $Z = -3{,}888$ dengan $p < 0{,}001$, yang menunjukkan peningkatan signifikan secara statistik. Skor N-Gain rata-rata sebesar 0,48 yang tergolong dalam kategori sedang. Seluruh item angket memperoleh skor di atas 4,0 pada skala Likert lima poin dengan rata-rata keseluruhan 4,37 dan dikategorikan sangat baik. Temuan ini menunjukkan bahwa media Virtual Tour efektif dalam meningkatkan motivasi, interaksi, dan penguasaan kosakata Arab secara kontekstual. Penelitian ini berkontribusi pada pengembangan media digital dalam pembelajaran bahasa Arab serta menawarkan alternatif inovatif bagi guru bahasa Arab tingkat dasar.

Kata Kunci: *Kosakata Bahasa Arab, Virtual Tour, Media Pembelajaran Interaktif, Teknologi Pendidikan.*

INTRODUCTION

Languages are significant not merely as a means of communication; they also serve as a vehicle for the growth and dissemination of human knowledge across many scientific and intellectual fields, advancing benefits for humanity.[1] Arabic has a central role in Islam because it is the language of the Qur'an and worship. The speciality of its structure makes it the only language capable of conveying the full meaning of the Qur'an. In Islamic education, Arabic language proficiency is the main foundation for understanding religious teachings in depth.[2] For Arabic learners, mufrodat (vocabulary) is a crucial basic element for mastering the language. Teaching mufrodat is essential, because without a solid vocabulary, a learner cannot develop other language skills effectively.[3] According to Nation, effective vocabulary learning requires spaced repetition,

[1] Ashraf M Zedan et al., "The Role of Language in Education : Arabic as Case Study," *Procedia - Social and Behavioral Sciences* 70 (2013): 1002–8, https://doi.org/10.1016/j.sbspro.2013.01.151.

[2] Ayu Sekarsari et al., "The Role of Arabic in Islamic Education," *Journal of Education, Arabic, and Islamic Studies* 2, no. 3 (2024): 176–82, https://doi.org/10.58355/qwt.v2i3.65.

[3] Beta Fadiatun Nisa', Anin Nurhidayati, and Luk-luk Nur Mufidah, "Teknik Pembelajaran Kosa Kata Bahasa Arab Dengan Multimedia," *Irsyaduna: Jurnal Studi Kemahasiswaan* 3, no. 1 (2023): 118–29, https://doi.org/https://doi.org/10.54437/irsyaduna.

retrieval practice, rich and varied encounters with words, and sufficient time-on-task.[4] However, teaching mufrodat at schools, especially at the elementary level, often poses a challenge. One of the main obstacles is the difference between students' mother tongue and the Arabic being learned.[5] In addition, another difficulty faced by students is their inability to use Arabic vocabulary within everyday sentence structures. The use of less engaging media often leads to monotonous learning experiences, reducing student interest and retention.[6]

This issue was also observed during a preliminary study at an Integrated Islamic Elementary School (SDIT), a type of school in Indonesia that combines the national curriculum with Islamic values, where Arabic is taught as a compulsory subject. [7] Interviews and observations indicated that Arabic language instruction at this school is still conducted using traditional methods, such as listening to teacher explanations, memorization, and simple learning media. The limited instructional time often causes students to struggle with vocabulary retention, and their motivation is uneven. The main difficulties faced by students include mastering vocabulary, using it in everyday sentence structures, and quickly becoming bored when learning is limited to textbooks. Teachers emphasize the importance of vocabulary acquisition; however, limitations in instructional strategies and media hinder optimal learning.

These findings reveal a clear problem in the current learning environment: students have limited exposure to contextualized Arabic vocabulary, resulting in weak retention; existing media do not meet multimedia-learning standards; vocabulary learning lacks meaningful interaction; and motivation decreases when learning relies solely on static materials. Therefore, there is an urgent need for innovative and interactive media that provide immersive visual context and are consistent with Mayer's Multimedia Learning Theory, which explains that learning becomes more effective when information is presented through integrated verbal and visual channels that encourage active cognitive processing.[8] The success of the learning process depends on how well the instructional

[4] Marina Dodigovic, "Vocabulary Within a Four Strands Curriculum : An Interview with Paul Nation," *International Journal of TESOL Studies* 5, no. 2 (2023): 132–42, https://doi.org/10.58304/ijts.20230210.

[5] Sri Zulfida et al., "Arabic Vocabulary Learning Strategies in Early Childhood: A Case Study At An Integrated Islamic Elementary School," *An-Nabighoh* 26, no. 2 (2024): 269–86, https://doi.org/10.32332/an-nabighoh.v26i2.269-286.

[6] Mariyatul Qibtiyah and Walfajri, "Pengajaran Bahasa Arab Menggunakan Media Gambar Bergerak Untuk Meningkatkan Penguasaan Kosakata," *Al-Nabighoh: Jurnal Pendidikan Dan Pembelajaran Bahasa Arab* 22, no. 01 (2020): 71–86, https://doi.org/10.32332/an-nabighoh.v22i01.2076.

[7] Yoke Suryadarma et al., "The Concept of Interactive Arabic Learning Media Uses the First-Person Shooter Gamification Method El Concepto de Medios Interactivos de Aprendizaje de Árabe Utiliza El Método de Gamificación Del Shooter En Primera Persona," *Salud, Ciencia y Tecnologia*, 2025, https://doi.org/10.56294/sctconf20251352.

[8] Richard E. Mayer, "The Past, Present, and Future of the Cognitive Theory of Multimedia Learning," *Educational Psychology Review* 36, no. 1 (2024): 1–25, https://doi.org/10.1007/s10648-023-09842-1.

media match students' needs and the learning content.[9] Educational technology now provides various tools that can support Arabic instruction, especially for subjects that require strong visualization and interactivity.[10] When used effectively, digital media can increase learner engagement, create more meaningful learning experiences, and help students develop a deeper understanding of concepts.[11] In this context, immersive technologies such as Virtual Tour have emerged as a new innovation that integrates the real and virtual worlds to create more vivid learning experiences. A Virtual Tour allows learners to "explore" a 360° environment through computer mediation, providing interactions that go beyond traditional perception and facilitating contextual vocabulary learning.[12] A virtual experience involves a person's engagement within a digitally mediated setting. In this context, a Virtual Tour serves as a distinct type of virtual interaction that replicates the feeling of visiting a real-world location.[13]

Several studies have explored a variety of digital learning media to support vocabulary (mufrodat) acquisition. Quizziz has been widely adopted to create interactive quizzes,[14] Genially has improved students' comprehension and higher-order engagement,[15] and Mimimo Flashcard media has reduced boredom during learning.[16] These studies show that digital vocabulary-learning tools are increasingly diverse; however, none have employed Virtual Tour technology for this purpose. Studies on other subject areas also show promising results; for example, a Virtual Tour on Lebak local products effectively improved students' media literacy;[17] Another study reported that

[9] Thityn Ayu Nengrum and Muh Arif, "Efektivitas Media Pembelajaran Dalam Penguasaan Kosa Kata Bahasa Arab," *'A Jamy: Jurnal Bahasa Dan Sastra Arab* 9, no. 1 (2020): 1–15, http://journal.umgo.ac.id/index.php/AJamiy/index.

[10] Zikrullah Nuzuli and Nurdina Afrah, "Strategi Pembelajaran Bahasa Arab Yang Efektif Di Era Digital," *Jurnal Manajemen Pendidikan Dan Keislaman*, 2024, 384–91, http://jurnal.uinsu.ac.id/index.php/hijri.

[11] Intan Khoirun Nisa et al., "Studi Literatur : Tren Penelitian Pengembangan Media Pembelajaran Interaktif Untuk Jenjang Sekolah Dasar Tahun 2020-2025," *Didaktika: Jurnal Kependidikan* 14, no. 3 (2025): 4999–5010, https://jurnaldidaktika.org.

[12] Oleksandr I Pushkar et al., "Experience in Developing and Implementing Virtual Tours Using 360 ° Video Technology in the Educational Environment," in *CEUR Workshop Proceedings* (Ukraine: 7th International Workshop on Augmented Reality in Education, 2024), 308–18.

[13] Hector Cardona, Carlos Lara-alvarez, and Ezra Federico Parra-González, "Virtual Tours to Facilities for Educational Purposes : A Review," *TEM Journal* 12, no. 3 (2023): 1725–31, https://doi.org/10.18421/TEM123.

[14] Lutvi Ali Sahana Anggian, "Media Pembelajaran Bahasa Arab Di Era Digital," *Mahira: Journal of Arabic Studies* 2, no. 2 (2022): 137–49, https://doi.org/https://doi.org/10.55380/mahira.v2i2.386.

[15] Siti Nurjamilah and Eni Fariyatul Fahyuni, "Penerapan Media Pembelajaran Berbasis Web ' Genially ' Terhadap Hasil Belajar Siswa Pada Materi Mufradāt Bahasa Arab," *Al Mi'yar: Jurnal Ilmiah Pembelajaran Bahasa Arab Dan Kebahasaaraban* 7, no. 2 (2024): 700–707, https://doi.org/10.35931/am.v7i2.3862.

[16] Abdul Hafidz bin Zaid et al., "Mimimo-Flashcard : Vocabulary Learning Media Based on the Mimicry Memorization Method," *LISANIA: Journal of Arabic Education and Literature* 6, no. 1 (2022): 1–13, https://doi.org/10.18326/lisania.v6i1.1-13.

[17] Ajeng Ginanjar and Aim Abdulkarim, "Improving Social Studies Learning Media Literacy in Elementary School Students Through Virtual Tour Media of Lebak Local Products," *Journal of Public Representative and Society Provision* 4, no. 3 (2024): 151–60, https://doi.org/10.55885/jprsp.v4i3.600.

the same technology increased fourth-grade students' interest in learning IPAS.[18] In addition, 360° Virtual Tour based learning media has been rated "Highly Feasible" for mathematics instruction, and has significantly helped hearing-impaired students understand the material more easily.[19] In the broader context of post-pandemic digital learning, immersive technologies have become increasingly important for maintaining students' motivation and supporting contextual understanding in various subjects. However, despite these positive findings, no studies have specifically applied Virtual Tour technology to enhance Arabic vocabulary (mufrodat) learning at the elementary school level. At the international level, Virtual Tour technology has been widely implemented in various fields such as engineering education, where it supports immersive exploration, interactive quizzes, and contextual learning.[20] However, existing studies have not examined language learning outcomes, and many researchers emphasize the need for quantitative evaluation to determine the long-term effectiveness of Virtual Tour–based learning. To date, no research has applied 360° Virtual Tour technology to Arabic vocabulary instruction at the elementary-school level.

The novelty of this research lies in the integration of Virtual Tour technology as a medium for Arabic vocabulary instruction at the elementary level, which has not been previously explored in this context. This study was conducted at an Integrated Islamic Elementary School, providing a contextual example of how interactive technology can be applied in primary Islamic education. It adopts a quasi-experimental design, specifically a one-group pretest posttest format, as detailed in the Methods section. In this research, the use of Virtual Tour media is positioned as the independent variable, with students' Arabic vocabulary achievement as the outcome variable.

The primary objective of this research is to determine the effectiveness of Virtual Tour technology in supporting Arabic vocabulary acquisition among elementary students. Theoretically, it contributes to expanding scholarly discourse on technology, and enhanced Arabic vocabulary instruction within primary education contexts. Practically, the results are expected to offer an innovative and interactive alternative learning medium for Arabic teachers at the elementary level. Based on this objective, the research hypothesis proposed is: "The Virtual Tour media is effective in

[18] Mei Rina Tri Wulandari, Muhammad Idris, and David Budi Irawan, "Student Interest in Science Learning Using Virtual Tour Media : A Quantitative Study of Fourth-Grade Students," *Journal of Innovation and Research in Primary Education* 4, no. 4 (2025): 1927–35, https://doi.org/10.56916/jirpe.v4i4.1886.

[19] Rezza Trie Kusdayati, Yandi Heryandi, and Saluky, "Pengembangan Media Pembelajaran Berbasis Virtual Tour 360 Pada Materi Bangun Ruang Terhadap Siswa Tunarungu," *Journal of Advanced Learning Media Development* 1, no. 2 (2024), https://doi.org/10.37396/jalmd.v1i2.6.

[20] Claudio Carvilhe et al., "Educational Virtual Tours : Creating Immersive and Interactive Tours to Support the Teaching and Learning Process," in *11th International Conference of the Immersive Learning Research Network Practitioner Proceedings ILRN2025*, 2025, https://doi.org/10.56198/qcke5820.

improving the Arabic vocabulary mastery of students at an Integrated Islamic Elementary School in Yogyakarta".

METHOD

This study employed a quasi-experimental approach with a one-group pretest–posttest design. This design was chosen because the research aimed to measure the improvement in students' Arabic vocabulary mastery within their regular classroom setting without disrupting ongoing instruction. Although this design is susceptible to internal validity threats such as maturation, testing effects, and history, steps were taken to minimize these risks, including standardized administration procedures, consistent timing for both test, and monitoring of classroom conditions during the intervention. The population of this study consisted of all fifth-grade students at the Integrated Islamic Elementary School. From this population, one class of approximately 28 students was purposively selected as the experimental sample. The purposive sampling method was chosen due to their comparable Arabic proficiency and in accordance with the required criteria.[21] This selection ensured that all participants could fully engage in the Virtual Tour intervention and provided a consistent basis for evaluating its effectiveness. The class consisted of students aged 10–11 years, with a balanced mix of boys and girls, and represented a typical fifth-grade learning environment at the school.

Data were collected using several complementary instruments. *First,* classroom observations were conducted by the researcher to monitor students' learning activities during the use of the Virtual Tour media, focusing on interaction, participation, and motivation in contextual vocabulary learning. The Arabic teacher acted as a facilitator and supervisor during the sessions. Students accessed the Virtual Tour media in pairs using one computer, allowing collaborative interaction while ensuring individual engagement with the learning tasks. *Second,* teacher interviews were carried out to identify challenges, students' learning needs, and teachers' perspectives on vocabulary instruction and media use. *Third,* questionnaires were administered to students to explore their perceptions of the learning media and the extent to which it motivated them in learning Arabic. The questionnaire consisted of 10 items using a five-point Likert scale, ranging from strongly disagree to strongly agree. The items measured students' interest, motivation, ease of use, and perceived usefulness of the Virtual Tour media. Prior to administration, the questionnaire was reviewed by experts in Arabic language education and instructional media to ensure content relevance and clarity (content validity). Subsequently, the questionnaire was piloted with students,

[21] Rifa'i Abubakar, *Pengantar Metodologi Penelitian* (Yogyakarta: SUKA-Press UIN Sunan Kalijaga, 2021).

and item validity was examined using item–total correlation analysis, then reliability was measured using Cronbach's Alpha.

Table 1. Validity Test Results of the Student Questionnaire

No	R- Count	Sig. (2-tailed)	R-Table	Result
1	.654**	.000	0,361	Valid
2	.681**	.000	0,361	Valid
3	.811**	.000	0,361	Valid
4	.672**	.000	0,361	Valid
5	.534**	.002	0,361	Valid
6	.737**	.000	0,361	Valid
7	.370*	.044	0,361	Valid
8	.639**	.000	0,361	Valid
9	.678**	.000	0,361	Valid
10	.673**	.000	0,361	Valid

Table 2. Reliability Test Results of the Student Questionnaire

Reliability Statistics	
Cronbach's Alpha	N of Items
.839	10

Based on Tables 1 and 2, all questionnaire items show correlation coefficients exceeding the r-table value (0.361) with significance levels below 0.05, indicating that all items are valid. In addition, the Cronbach's Alpha value of 0.839 demonstrates that the questionnaire has high internal consistency and is reliable for measuring students' perceptions of the Virtual Tour media. Finally, a quantitative examination of the media's efficacy was conducted using written vocabulary tests administered for both tests before and after the intervention. The vocabulary test initially consisted of 20 multiple-choice items focusing on everyday Arabic vocabulary presented through the Virtual Tour, for example matching images with the Arabic words or selecting the appropriate meaning of a word based on a visual context. The level of vocabulary difficulty was determined based on the fifth-grade Arabic textbook and curriculum objectives to ensure suitability for students' proficiency levels. Students' vocabulary mastery was measured by the number of correct responses, with higher scores indicating better mastery. The vocabulary test items were first reviewed by Arabic language

experts to establish content validity, then administered to students, and empirical validity was analyzed using item total correlation.

Table 3. Validity Test Results of the Vocabulary Test

No	R-Count	Sig. (2-tailed)	R-Table	Result
1	.390*	.033	0,361	Valid
2	.418*	.021	0,361	Valid
3	.344	.063	0,361	Not Valid
4	.398*	.030	0,361	Valid
5	.420*	.021	0,361	Valid
6	.496**	.005	0,361	Valid
7	.392*	.032	0,361	Valid
8	.419*	.021	0,361	Valid
9	.653**	.000	0,361	Valid
10	.357	.053	0,361	Not Valid
11	.644**	.000	0,361	Valid
12	.184	.330	0,361	Not Valid
13	.662**	.000	0,361	Valid
14	.354	.055	0,361	Not Valid
15	.419*	.021	0,361	Valid
16	.483**	.007	0,361	Valid
17	.519**	.003	0,361	Valid
18	.624**	.000	0,361	Valid
19	.664**	.000	0,361	Valid
20	.451*	.012	0,361	Valid

Table 4. Reliability Test Results of the Vocabulary Test

Reliability Statistics	
Cronbach's Alpha	N of Items
.811	20

Based on the item validity analysis presented in Table 3, out of the 20 vocabulary test items initially developed, 16 items met the validity criteria, indicated by correlation coefficients exceeding the r-table value (0.361) with significant p-values. Four items showed insufficient correlation values and were therefore excluded. To ensure practicality and consistency between the

pretest and posttest, 15 valid items were ultimately selected and used in the final analysis. As shown in Table 4, the reliability analysis yielded a Cronbach's Alpha coefficient of 0.811, indicating that the vocabulary test had acceptable internal consistency and was reliable for use in this study.

The data analysis began with descriptive statistics to illustrate the students' vocabulary scores on the pretest and posttest. Descriptive analysis included mean, median, standard deviation, as well as minimum and maximum values.[22] Subsequently, assumption tests were conducted to ascertain whether the information complied with parametric testing standards, which would guide the selection of appropriate inferential tests. Based on these tests, the suitable inferential test was applied to examine the effectiveness of the Virtual Tour media in improving students' Arabic vocabulary mastery. In addition, learning improvement was analyzed using the normalized gain (N-Gain) score. The resulting N-Gain values were interpreted based on established criteria: high ($g \geq 0.70$), moderate ($0.30 \leq g < 0.70$), and low ($g < 0.30$). This analysis was used to determine the effectiveness of the Virtual Tour media in improving students' Arabic vocabulary mastery.

RESULT AND DISCUSSION

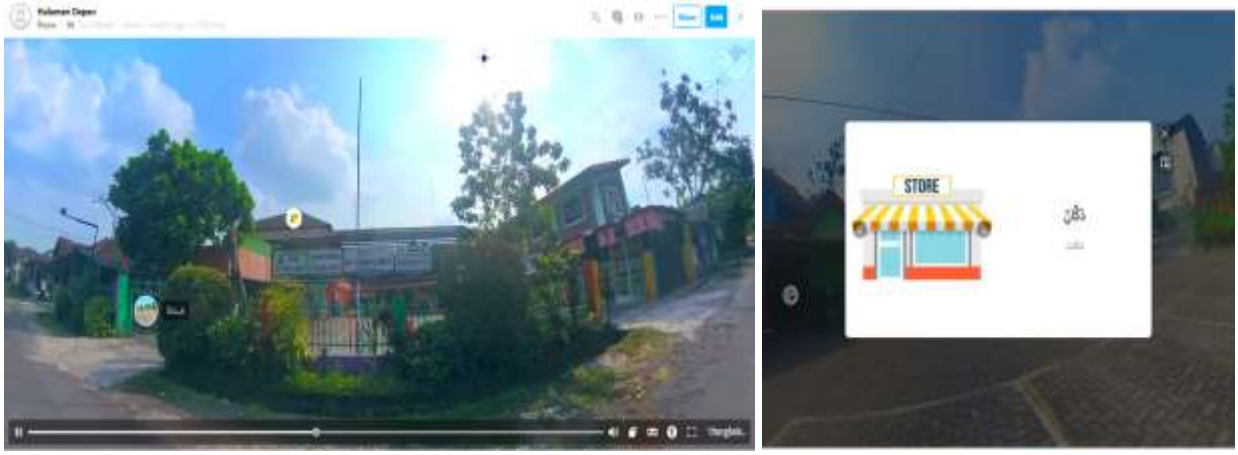
Implementation of Virtual Tour Media in Arabic Class

This section presents the findings and analysis of how Virtual Tour media supported students' Arabic vocabulary mastery at an Integrated Islamic Elementary School. The findings are discussed based on data collected through several instruments. The first step of the preliminary investigation was a classroom observation, which showed that Arabic lessons were conducted traditionally, relying on teacher explanations, vocabulary memorization, and simple media such as flashcards. To gain deeper insights, the researcher conducted an interview with the Arabic teacher to explore learning conditions and challenges. The teacher explained that Arabic lessons are limited to one hour per week, making it difficult to monitor students' understanding. Students' motivation also varied, with some showing enthusiasm while others easily lost interest. This situation calls for the use of more engaging media that can help the teacher facilitate the learning process.[23]

Based on these findings, the researcher developed a Virtual Tour learning media using the ThingLink platform to improve fifth-grade students' mufrodat mastery. The media presents a 360° panoramic school environment with interactive hotspots containing Arabic vocabulary, audio pronunciation, images, and short quizzes. This approach supports contextual and independent learning, with the teacher acting as a facilitator.

[22] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, Dan R&D*, 19th ed. (Bandung: Alfabeta, 2013).
[23] Interview with Arabic Lesson's Teacher, Fitria Apriliyani, Yogykarta, June 20, 2025.

Figure 1. Display of Virtual Tour Media for Arabic Vocabulary Learning



The learning implementation was carried out in the computer laboratory following the sequence below:

Table 5. Steps for Teaching Vocabulary with Virtual Tour Learning Media

Stage	Duration	Main Activities
Introduction	5 minutes	Greeting students, giving a short lead-in about school objects, and stating the learning objectives.
Material Presentation	40 minutes	Students use the Virtual Tour media, learn vocabulary through audio–visual materials, explore the hotspots individually, and complete the interactive quiz.
Evaluation	10 minutes	Students mention the vocabulary they have mastered and create simple sentences using the new words.
Closing	5 minutes	Reviewing the learned vocabulary, motivating students to apply it in daily life, and closing the lesson.

During the session, the researcher and teacher accompanied the learning process and ensured that all students could access the media properly. Throughout the activity, students actively interacted with the media, answered the questions provided, and discussed with their peers to find the correct answers. This observation showed that using the Virtual Tour increased students' motivation, participation, and engagement in learning Arabic vocabulary. The teacher also provided direct feedback on the difficulties encountered by the students and helped reinforce their understanding. The media's visual and auditory elements helped students associate vocabulary with real-life contexts. Several students expressed excitement when encountering familiar school objects in Arabic. This immersive experience fostered a more meaningful learning atmosphere.

Figure 2. Learning Situation with Virtual Tour Media in the Computer Laboratory

This approach allowed students to learn in a more enjoyable and contextual way, while giving the researcher the opportunity to collect data on students' responses, vocabulary mastery, and the effectiveness of the media prior to conducting quantitative analysis through pre-test and post-test.

Students' Motivation and Engagement toward Virtual Tour Media

To further examine students' interest in learning Arabic through the Virtual Tour media, the researcher administered an interest questionnaire after the learning session. This questionnaire was designed to capture students' perceptions, motivation, and level of engagement during the lesson, which aligns with the use of questionnaires in language teaching research to explore learners' attitudes and behaviors [24]. The following table presents the results of the questionnaire analysis:

Table 6. Assessment Results of Students' Motivation and Engagement

No.	Assesment	Score	Average
1	The media makes Arabic vocabulary learning easier	99	4,30
2	The media is attractive and enjoyable	103	4,48
3	The media is fun for students	102	4,43
4	The media is easy for students to understand	96	4,17
5	The media matches the Grade 5 vocabulary material	100	4,35
6	The media reduces boredom in learning	104	4,52

[24] Peter Yongqi Gu, "Questionnaires in Language Teaching Research," *Language Teaching Research* 20, no. 5 (2016): 567–70, https://doi.org/10.1177/1362168816664001.

No.	Assesment	Score	Average
7	The media increases students' interest in learning Arabic	96	4,17
8	The content in the media is clearly presented	101	4,39
9	The size and layout of the media are appropriate	101	4,39
10	The images in the media match the vocabulary material	103	4,48
	Total	**1005**	**43,70**
	Overall Average		**4,37**

The results in Table 6 show that all questionnaire items obtained mean scores above 4.0 on a five-point Likert scale, with the overall mean of 4.37, which falls into the very good category. This indicates that students generally showed high motivation and engagement when learning Arabic vocabulary through the Virtual Tour media. Among the indicators, the highest mean score (4.52) was obtained on the item "The media reduces boredom in learning", suggesting that the Virtual Tour successfully created a more enjoyable and less monotonous learning experience. Similarly, the items "The media is attractive and enjoyable" and "The images in the media match the vocabulary material" also achieved high averages (4.48), reflecting the students' positive perception of the media's visual appeal and content relevance.

Meanwhile, the item with the lowest, though still high, mean score (4.17) was "The media is easy for students to understand" and "The media increases students' interest in learning Arabic," indicating that although the media was generally well-received, some students may still require additional guidance or scaffolding when interacting with the Virtual Tour. This finding is consistent with previous studies showing that virtual tour–based learning media effectively enhances students' motivation and engagement, supporting its feasibility as an innovative tool for improving Arabic vocabulary mastery.[25]

Effectiveness of Virtual Tour Media on Arabic Vocabulary Mastery

The improvement of students' Arabic vocabulary mastery was analyzed using achievement tests administered before and after the implementation of the Virtual Tour media. Descriptive statistical analysis, including measures of central tendency and score distribution, was applied to compare students' vocabulary mastery prior to and following the intervention. The results of the analysis are summarized below:

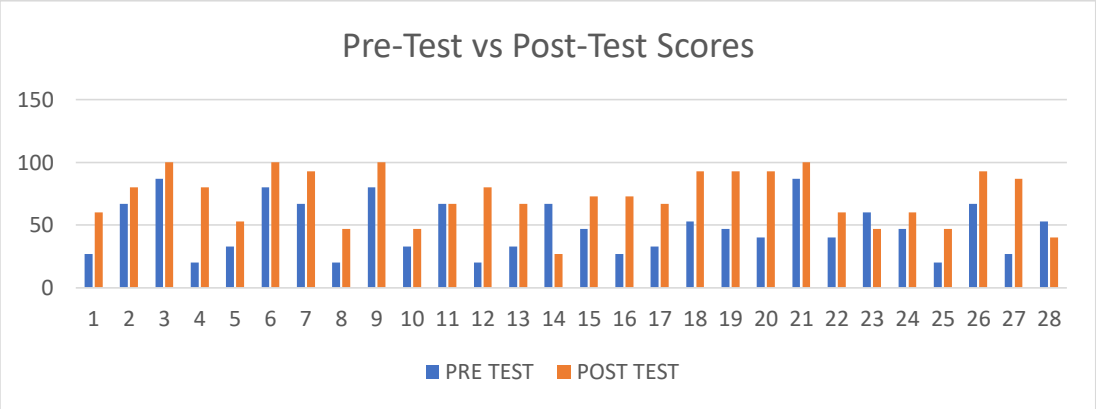
[25] Rina Tri Wulandari, Idris, and Budi Irawan, "Student Interest in Science Learning Using Virtual Tour Media : A Quantitative Study of Fourth-Grade Students."

Table 7. Descriptive Analysis Results of Pre-Test and Post-Test Scores

Descriptive Statistics		Pre-Test	Post-test
N	Valid	28	28
	Missing	0	0
Mean		48,18	72,39
Median		47,00	73,00
Mode		67	93
Std. Deviation		21,584	21,233
Minimum		20	27
Maximum		87	100

Table 7 presents the descriptive statistical results of students' pre-test and post-test scores. The findings reveal a clear enhancement in vocabulary mastery, as evidenced by an increase in the mean score from 48.18 before the intervention to 72.39 afterward. The median and mode also show a similar increase, suggesting an overall enhancement in performance. Additionally, both the minimum and maximum values increased, which suggests that even the lowest-performing students showed improvement, and the highest performers achieved near-perfect scores. To visually illustrate the distribution of students' scores, the following figure presents a comparison of individual pre-test and post-test results.

Figure 3. Comparison of Pre-Test and Post-Test Scores



The figure shows individual students' scores before and after the implementation of the Virtual Tour media. Most students demonstrated a noticeable increase in their post-test scores, indicating improved mastery of Arabic vocabulary. Next, assumption tests were conducted to determine whether the data were normally distributed, which would guide the selection of the

appropriate inferential test. There are several methods for testing normality, and in this study, the Shapiro Wilk test was used because it is recommended for small to medium sample sizes [26]. The results of the normality test are presented as follows:

Table 8. Tests of Normality (Shapiro–Wilk)

Type of Test	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-Test	152	28	,097	,924	28	,045
Post-test	156	28	,081	,933	28	,074

a.: Lilliefors Significance Correction

The normality of the data was assessed using the Shapiro–Wilk test. According to the standard criterion, a p-value greater than 0.05 indicates that the data are normally distributed, whereas a p-value less than 0.05 indicates non-normal distribution. Based on this test, the pre-test scores were not normally distributed (p = 0.045), whereas the post-test scores were normally distributed (p = 0.074).

Since the pre-test scores did not meet the normality assumption, the Wilcoxon signed-rank test was applied to examine the significance of the improvement in students' Arabic vocabulary mastery. The inferential test used was hypothesis testing, which examined the following:

1. Null hypothesis (H_0): There is no significant improvement in students' Arabic vocabulary mastery after using the Virtual Tour media.
2. Alternative hypothesis (H_1): There is a significant improvement in students' Arabic vocabulary mastery after using the Virtual Tour media.

The significance of the result was evaluated based on the p-value: a p-value less than 0.05 indicates a significant difference, leading to rejection of H_0, whereas a p-value greater than 0.05 indicates no significant difference, leading to acceptance of H_0. Then, the results of the Wilcoxon signed-rank test are presented in the following table:

Table 9. Wilcoxon Signed-Rank Test: Rank Summary

		N	Mean Rank	Sum of Ranks
Post-test - Pre-Test	Negative Ranks	3[a]	9.17	27.50
	Positive Ranks	24[b]	14.60	350.50
	Ties	1[c]		
	Total	28		

a. Post-test < Pre-Test b. Post-test > Pre-Test c. Post-test = Pre-Test

[26] S Shapiro and M.B Wilk, "An Analysis of Variance Test for Normality (Complete Samp1es) T," *JSTOR : Biometrika Trust* 52, no. 3 (2007): 591–611, http://www.jstor.org/journals/bio.html.

Test Statistics[a]	Post-test - Pre-Test
Z	-3.888[b]
Asymp. Sig. (2-tailed)	.000
a. Wilcoxon Signed Ranks Test b. Based on negative ranks.	

The Wilcoxon signed-rank test showed that most students experienced improvement after using the Virtual Tour media, with 24 students obtaining higher post-test scores, 3 students showing score decreases, and 1 student showing no change. The test results indicated a significant improvement in Arabic vocabulary mastery ($Z = -3.888$, $p < 0.001$), leading to the rejection of the null hypothesis. The effect size was calculated using $r = Z/\sqrt{N}$, yielding $r = 0.73$, which indicates a large effect. The score declines observed in a small number of students may be attributed to individual factors such as limited attention during the post-test or ceiling effects among students with relatively high pre-test scores, rather than limitations of the media itself. In addition, N-Gain analysis was conducted to determine the extent of students' vocabulary improvement. The results are presented in the following table:

Table 10. N-Gain Score of Students' Vocabulary Improvement

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
NGain_Score	28	-1,21	1,00	,4796	,49272
Valid N (listwise)	28				

The N-Gain score was calculated using the formula $N - Gain = \frac{Posttest - Pretest}{100 - Pretest}$ to measure the magnitude of students' vocabulary improvement. Based on the analysis, the mean N-Gain score was 0.48, which falls into the moderate improvement category according to Hake's criteria. Although most students showed positive gains, a small number of students obtained negative N-Gain values due to decreases in post-test scores. One extreme negative value below –1 was identified and interpreted as an outlier, possibly caused by testing conditions or a ceiling effect from high pre-test scores. Overall, the results indicate that the Virtual Tour media contributed to a moderate improvement in students' Arabic vocabulary mastery, and students with higher motivation tended to achieve greater learning gains.

This improvement indicates that the interactive virtual-tour media is able to present vocabulary content visually and contextually, enhance learners' engagement through interactive features, and facilitate word comprehension through multimodal links. These results align with constructivist theory, which emphasizes the learner's active role in constructing knowledge through

meaningful learning experiences. The virtual-tour environment supports this principle by providing a rich visual and interactive learning context.[27] Additionally, the findings are consistent with Mayer's Multimedia Learning Theory, which states that learning becomes more effective when information is presented through a combination of text, images, and audio. The virtual tour embodies this principle by delivering vocabulary input through integrated multimodal representations.[28] In line with these theories, previous studies have shown that 360° virtual tour–based learning media effectively supports students' understanding across different subject areas. This suggests that virtual-tour media has strong potential to enhance learning in various instructional contexts.[29]

CONCLUSION

This study confirms that Virtual Tour–based interactive media effectively enhances Arabic vocabulary mastery among elementary school students. The integration of visual, auditory, and interactive elements creates a contextual learning environment that supports self-paced exploration and increases student motivation. The significant improvement in posttest scores and active student participation demonstrates the pedagogical value of this media in vocabulary instruction. These findings contribute to the broader discussion on the use of educational technology in language learning, particularly in contexts with limited instructional time. By providing a flexible and immersive learning experience, Virtual Tour media offers practical insights for Arabic language teachers seeking innovative ways to enrich vocabulary learning. Furthermore, the use of meaningful visual contexts indicates potential benefits for longer-term vocabulary retention and integrative language learning. In conclusion, Virtual Tour based media shows strong potential as a transformative tool in Arabic language education at the elementary level. By connecting abstract vocabulary with real-world contexts, the media fosters deeper comprehension and sustained engagement. Future research is recommended to examine its application across different language skills, grade levels, and learning settings, as well as to explore its long-term impact through comparative or longitudinal studies.

[27] Steve Olusegun, "Constructivism Learning Theory: A Paradigm for Teaching and Learning," *IOSR Journal of Research & Method in Education Ver. I* 5, no. 6 (2015): 2320–7388, https://doi.org/10.9790/7388-05616670.

[28] Richard E Mayer and Roxana Moreno, "Cognitive Principles of Multimedialearning: The Role of Modality and Contiguity," *Journal of Educational Psychology* 91, no. 2 (1999): 358–68.

[29] Kusdayati, Heryandi, and Saluky, "Pengembangan Media Pembelajaran Berbasis Virtual Tour 360 Pada Materi Bangun Ruang Terhadap Siswa Tunarungu."

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