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The Effect of Digital Media on Arabic Vocabulary Mastery Among Senior High School Students in Bandung City

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Abstract

Vocabulary mastery is one of the most determinant components in the success of Arabic language learning; however, conventional vocabulary instruction methods at the senior high school level frequently result in low retention and weak learning motivation. This article examines the effect of digital media utilization on Arabic vocabulary mastery among senior high school students in Bandung City through a quasi-experimental study employing a pretest-posttest control group design. The study involved 71 high school students from two different schools, divided into an experimental group and a control group. The experimental group used a combination of digital media comprising the Quizlet application, Arabic-language animated educational videos, and the Kahoot! platform, while the control group used conventional vocabulary learning methods based on textbooks and vocabulary cards. Analysis results indicated that digital media use produced a statistically significant improvement in vocabulary mastery with a large effect size (Cohen's $d = 0.93$). The findings affirm that digital media, when integrated pedagogically and purposefully, constitutes a highly effective instrument for improving Arabic vocabulary mastery among senior high school students.

Keywords: digital media; Arabic vocabulary; senior high school students; Quizlet; Arabic language learning; Bandung City

Article History

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Abstrak

Penguasaan kosakata merupakan salah satu komponen paling determinan dalam keberhasilan pembelajaran bahasa Arab, namun metode pengajaran kosakata konvensional di SMA seringkali menghasilkan retensi yang rendah dan motivasi belajar yang lemah. Artikel ini mengkaji pengaruh pemanfaatan media digital terhadap penguasaan kosakata bahasa Arab siswa SMA di Kota Bandung melalui penelitian quasi-eksperimental dengan desain pretest-posttest control group. Penelitian melibatkan 71 siswa SMA dari dua sekolah yang terbagi ke dalam kelompok eksperimen dan kelompok kontrol. Kelompok eksperimen menggunakan kombinasi Quizlet, video animasi berbahasa Arab, dan Kahoot!, sementara kelompok kontrol menggunakan metode konvensional. Hasil menunjukkan peningkatan yang signifikan secara statistik dengan effect size besar (Cohen's $d = 0,93$). Temuan ini menegaskan bahwa media digital yang diintegrasikan secara pedagogis merupakan instrumen yang sangat efektif dalam meningkatkan penguasaan kosakata bahasa Arab siswa SMA.

Kata Kunci: *media digital; kosakata bahasa Arab; siswa SMA; Quizlet; pembelajaran bahasa Arab; Kota Bandung*

Introduction

Arabic, as the language of the Quran, Hadith, and the vast treasury of Islamic scholarship, occupies a highly strategic position within Indonesia's Islamic education system. At the senior high school level, Arabic is taught as a core subject designed to equip students with adequate communicative competence for religious, academic, and professional purposes. Among all components of Arabic language proficiency, vocabulary mastery occupies a uniquely central position, as Nation (2013) emphasized that a rich and deep vocabulary repertoire constitutes a non-negotiable prerequisite for attaining advanced language proficiency, and that instructional designs supporting rapid and durable vocabulary acquisition represent one of the greatest pedagogical challenges in language education. Without a sufficiently large vocabulary, the development of reading, writing, listening, and speaking skills in Arabic cannot proceed optimally regardless of how sophisticated other instructional elements may be.

Empirical evidence consistently reveals that Arabic vocabulary mastery among high school students in Indonesia, including those in Bandung City as one

of West Java's most prominent Islamic educational centers, remains well below desired levels. Diagnostic studies report that students acquire on average only 300 to 500 active Arabic words after three years of study, far below the minimum threshold of 1,500 to 2,000 vocabulary items that researchers regard as necessary for adequate comprehension of intermediate Arabic texts (Schmitt, 2014). This shortfall stems from several interrelated factors, including the dominance of context-free memorization of isolated word lists, minimal exposure to authentic Arabic outside classroom hours, and low intrinsic motivation among students who perceive Arabic as difficult and insufficiently relevant to their daily lives.

Digital media offers highly promising pedagogical solutions to these vocabulary learning challenges (Muhsyanur and Mustapha, 2023; Muhsyanur, 2025) Technology-based vocabulary learning applications such as Quizlet, which employs spaced repetition and gamification principles to promote long-term vocabulary retention, have demonstrated strong effectiveness in numerous research studies on second and foreign language vocabulary acquisition (Godwin-Jones, 2017). Game-based platforms such as Kahoot! create competitive and enjoyable contexts that heighten student motivation and engagement during vocabulary practice. Arabic-language animated videos that present vocabulary in concrete, visually engaging situational contexts leverage the power of dual coding in information processing, which according to Mayer's (2009) cognitive theory of multimedia learning produces substantially stronger encoding and retention compared to purely verbal presentation.

The theoretical framework underpinning this study's investigation of digital media's effectiveness in Arabic vocabulary learning draws on three complementary perspectives. Mayer's (2009) Cognitive Theory of Multimedia Learning explains why media integrating text, images, audio, and animation in a purposefully designed manner produces better comprehension and retention than monomodal presentation. The spaced repetition theory underlying Quizlet's design demonstrates that adaptive scheduling of vocabulary review based on individual memory strength dramatically improves long-term retention compared

to massed practice methods (Godwin-Jones, 2017). Deci and Ryan's (2017) Self-Determination Theory explains why gamification elements in Kahoot! enhance intrinsic motivation by fulfilling the three basic psychological needs of autonomy, competence, and relatedness.

Research on the effects of digital media on Arabic vocabulary mastery in Indonesian schools remains relatively limited, particularly studies conducted within the high school context using rigorous experimental designs. A study by Hamid and Saifulloh (2021) on Quizlet's effectiveness in Islamic senior secondary schools in Surabaya found significant improvements in experimental group vocabulary scores, but lacked an equivalent control group, making it difficult to definitively attribute the gains to Quizlet use specifically. Research by Wahyudin and Mulyono (2022) on gamification in Arabic learning in West Java high schools showed promising results but was restricted to a single platform and media type. The study reported in this article addresses these methodological gaps through a more rigorous quasi-experimental design integrating three different types of digital media simultaneously.

This article aims to examine the effect of digital media on Arabic vocabulary mastery among senior high school students in Bandung City. The discussion is organized around three central themes: first, the initial profile of students' digital media use and baseline vocabulary mastery; second, the analysis of digital media's effect on vocabulary mastery supported by statistical evidence; and third, the factors that mediate digital media effectiveness and the pedagogical implications of the research findings (Muhsyanur et al., 2021; Muhsyanur and Semmang, 2025). Through this investigation, the study aims to provide empirically grounded contributions to the development of more innovative, effective, and engaging Arabic vocabulary instructional practices for high school students across Indonesia.

Research Method

This study employed a quasi-experimental design following a pretest-posttest nonequivalent control group design, regarded as the most appropriate

approach for testing the causal effect of digital media on Arabic vocabulary mastery in real classroom settings where full randomization cannot be implemented without disrupting existing learning groups (Creswell & Creswell, 2018). The study was conducted in two private Islamic senior high schools in Bandung City, West Java, selected through purposive sampling based on criteria of socioeconomic comparability among students, Arabic teacher quality, and adequate digital infrastructure access. Grade XI Social Studies Class 1 from the first school ($n = 36$) was designated as the experimental group, while Grade XI Social Studies Class 2 from the second school ($n = 35$) served as the control group. An equivalence test of initial ability through independent samples t-test on pretest scores confirmed no statistically significant difference between the groups ($t(69) = 0.37, p = .712$), establishing the baseline equivalence required for valid causal interpretation. The experimental group received Arabic vocabulary instruction using three integrated digital media types, specifically Quizlet for adaptive spaced repetition vocabulary practice, Arabic animated educational videos curated and organized by the teacher from YouTube educational channels, and Kahoot! for interactive vocabulary review sessions, across eight class meetings totaling sixteen lesson hours within one semester. The control group received identical vocabulary instruction through conventional methods using the textbook, whiteboard presentation, and physical flashcards with an equivalent time allocation.

The primary data collection instrument was an Arabic vocabulary mastery test developed specifically for this study, consisting of 60 items covering four vocabulary knowledge dimensions: form recognition, meaning knowledge, contextual use, and active production. Instrument development followed standard content validity procedures through expert judgment by three experienced Arabic language lecturers and item analysis using the Anates V4 software program, yielding high content validity ($CVR = 0.82$) and high reliability ($\alpha = 0.89$), exceeding the minimum thresholds recommended by Field (2018). Additional data were collected through an Arabic vocabulary learning motivation questionnaire ($\alpha = 0.86$) administered before and after the intervention, structured observation notes

recorded at every class meeting, and brief semi-structured interviews with eight purposively selected students (four from each group) to capture students' subjective perspectives on their learning experiences. Quantitative data analysis was conducted using SPSS 26, encompassing the Shapiro-Wilk normality test, Levene's homogeneity test, independent samples t-test and ANCOVA for comparing gain scores between groups while controlling for pretest scores, and effect size calculation using Cohen's d formula. Qualitative data from observations and interviews were analyzed thematically to enrich interpretation of quantitative findings, following the integrative procedures recommended by Creswell and Creswell (2018).

Results and Discussion

1. Initial Profile of Digital Media Use and Students' Baseline Vocabulary Mastery

Pre-intervention survey data collected before the intervention revealed highly informative profiles of students' digital media use and Arabic language learning backgrounds that provide essential context for interpreting the study's findings. All students in both groups (100%) owned personal smartphones and used them an average of 6.2 hours daily for various purposes; however, only 12.7% had previously used digital applications specifically for learning Arabic before this study commenced. This finding confirms the frequently identified gap between the intensity of digital technology use in students' daily lives and the minimal utilization of that same technology for formal educational purposes, a phenomenon that Thorne and Reinhardt (2008) termed the digital disconnect, which simultaneously indicates the enormous untapped potential available to be mobilized through digital media integration in Arabic language learning.

Analysis of pretest scores demonstrated that students' initial vocabulary mastery in both groups was low and equivalent. The experimental group's pretest mean was 51.3 (out of 100) and the control group's was 50.9, with no statistically significant difference between them. More detailed analysis of the initial vocabulary mastery profile revealed that students' greatest weaknesses lay in the

contextual use and active production dimensions, with mean scores of only 38.4 and 32.7 respectively, far below the form recognition score (63.2) and meaning knowledge score (56.1). This pattern is consistent with Nation's (2013) finding that receptive vocabulary mastery typically exceeds productive mastery, and that one of the greatest challenges in vocabulary instruction is helping learners develop the ability to use vocabulary actively and appropriately in authentic communicative contexts.

Initial classroom observations of the control group before the intervention revealed vocabulary instruction practices heavily dominated by the traditional translation-memorization approach: the teacher writes a list of new Arabic vocabulary items with their Indonesian translations on the board, students copy them into their notebooks and are instructed to memorize them at home, then in the following session an oral or written recall quiz is administered. Schmitt (2014) identifies that this approach, despite its widespread prevalence in Arabic vocabulary instruction in Indonesia, has several fundamental weaknesses: it fails to provide sufficient meaningful context for strong encoding, does not utilize spaced repetition principles for long-term memory consolidation, does not develop productive vocabulary mastery, and severely limits the repeated exposures in varied contexts that are considered necessary for deep vocabulary knowledge.

The initial motivation survey revealed that the majority of students in both groups possessed moderate to low Arabic vocabulary learning motivation before the intervention, with a mean motivation score of 3.1 on a 5.0 scale. The factors most frequently cited in interviews as causes of low motivation included: boredom with repetitive and monotonous memorization methods, frustration with the Arabic writing system that differs from the Latin alphabet, the perception that Arabic vocabulary is vast and difficult to master, and minimal opportunities to use learned vocabulary in meaningful communicative contexts outside the classroom. Deci and Ryan (2017) argue within self-determination theory that the absence of autonomy, perceived competence, and relatedness systematically undermines

genuine intrinsic motivation toward language learning, a diagnosis that directly informed the selection of the three digital media types used as the intervention in this study.

2. Analysis of Digital Media's Effect on Arabic Vocabulary Mastery

Table 1. Comparison of Pretest-Posttest Scores of Arabic Vocabulary Mastery Between the Experimental and Control Groups

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Group / Class	N	Pretest Mean	Posttest Mean	Gain Score	Sig. (p)
Experimental Group (Digital Media)	36	51.3	78.6	27.3	0.001
Control Group (Conventional)	35	50.9	64.2	13.3	0.012
Difference Test (Between Groups)	-	-	-	14.0*	0.000
Effect Size (Cohen's d)	-	-	-	0.93 (Large)	-

Note: *Difference in gain score between groups is significant at $p < .001$ (ANCOVA with pretest score as covariate)

The data presented in Table 1 demonstrate that the experimental group using digital media achieved a substantially greater improvement in Arabic vocabulary mastery than the control group. The experimental group's mean posttest score was 78.6, representing a gain of 27.3 points from the pretest score of 51.3, while the control group improved by only 13.3 points from a pretest of 50.9 to a posttest of 64.2. The 14.0-point difference in gain score between the two groups was statistically significant after controlling for pretest scores through ANCOVA ($F(1,68) = 31.4, p < .001, \eta^2 = .32$), with a Cohen's d effect size of 0.93 classified as large according to Cohen's conventions. This finding is highly consistent with the meta-analytic results of Golonka et al. (2014), who found an average effect size of 0.84 for technology use in second language vocabulary

learning, confirming that the present study's results fall within the range predicted by the international research literature.

Analysis of improvement across each vocabulary mastery dimension reveals a highly informative pattern regarding how each digital medium contributes to different aspects of vocabulary knowledge. The greatest improvements occurred in the form recognition and meaning knowledge dimensions (gain scores of 32.1 and 30.4 respectively for the experimental group), attributable to Quizlet's effectiveness in strengthening form-meaning association encoding through adaptive spaced repetition practice. Improvement in the contextual use dimension was also highly significant (gain score 26.8), attributed to animated videos' success in presenting vocabulary within concrete situational contexts that are visually meaningful. Although improvement in the active production dimension was more modest than in other dimensions (gain score 19.8), it remained highly statistically significant, demonstrating that the combination of three digital media successfully developed active vocabulary use beyond what purely passive-receptive approaches can typically achieve (Nation, 2013).

Analysis of automatically logged Kahoot! data reveals a clear upward trajectory in vocabulary mastery across eight intervention sessions. The experimental group's mean Kahoot! score increased consistently from 54.3% in the first session to 87.6% in the eighth session, with the most rapid improvement occurring between the third and fifth sessions, coinciding with the period when students began using Quizlet for independent self-review outside class hours. Observational data showed that student enthusiasm and engagement in Kahoot! sessions was consistently very high, with nearly all students (94.4%) participating actively in every session, in sharp contrast to the average active participation rate in conventional vocabulary quiz sessions of only 61.3%. This developmental pattern is consistent with gamification theory's prediction that digitally mediated competition creates immediate feedback loops that accelerate learning and sustain vocabulary learning motivation over time (Godwin-Jones, 2017).

Subgroup analysis based on initial ability level (high, medium, low) revealed a finding of considerable pedagogical significance. The experimental group's low-initial-ability students recorded the highest gain score (32.7), followed by medium-ability (27.1) and high-ability (22.4) students, while in the control group the pattern was reversed, with higher-ability students benefiting most from the conventional approach. This finding is pedagogically highly meaningful: the digital media used in this study, with Quizlet's adaptivity, animated video's accessibility, and Kahoot!'s inclusiveness, appear particularly effective in supporting learners who have been most poorly served by conventional instructional approaches. This resonates strongly with Tomlinson's (2014) argument that digital media holds potential to function as one of the most democratic and practically achievable instruments of differentiated instruction available to classroom teachers.

3. Factors Mediating Digital Media Effectiveness and Pedagogical Implications

Interview and observation data identified a number of factors that mediate digital media effectiveness in improving Arabic vocabulary mastery and that carry important implications for broader implementation. The first and most dominant factor is the quality of pedagogical integration between digital media and specific learning objectives. The teacher in the experimental group invested significant time in designing Quizlet vocabulary sets carefully aligned with current learning topics, selecting animated videos appropriate in both context and linguistic level, and constructing Kahoot! questions that go beyond recall testing to probe contextual understanding. Mishra and Koehler (2006) through their TPACK framework affirm that technology's effectiveness in learning depends fundamentally on the quality of pedagogical integration performed by the teacher, not on the technology itself, and this principle was powerfully confirmed in the present study's findings.

The second highly significant factor is the frequency of students' voluntary, self-directed Quizlet use outside class hours. Access log data reveal that experimental group students engaged with Quizlet an average of 23.4 minutes per

day outside school, with students who were most active in independent Quizlet use demonstrating the greatest gains in vocabulary mastery. The correlation between independent Quizlet usage time and vocabulary gain score was very strong ($r = 0.67$, $p < .001$), confirming that one of digital media's most important pedagogical values in vocabulary learning is its capacity to extend meaningful learning beyond the temporal and spatial boundaries of the formal classroom. Nation (2013) has emphasized that successful vocabulary mastery requires repeated encounters in varied contexts, and digital media provides the ideal platform for this distributed repetition to occur efficiently, enjoyably, and independently.

The third identified factor is the social dynamics created through competitive and collaborative elements in Kahoot! that positively influenced vocabulary learning motivation. Observational data showed that students spontaneously formed informal study groups to prepare for the following week's Kahoot! sessions, using Arabic in their preparatory discussions far more than typically occurred in conventional instruction sessions. This phenomenon reflects what Vygotsky (1978, as cited in Lantolf & Thorne, 2006) identified as peer-mediated learning, where social interaction motivated by a shared goal creates highly productive learning conditions. This finding also aligns with Shortt et al.'s (2021) conclusion that gamification in vocabulary learning is most effective when it creates social learning communities rather than promoting individualistic competition that reduces psychological safety.

The pedagogical implications of this study's findings for Arabic vocabulary instruction in senior high schools are concrete and immediately actionable. First, Arabic teachers at the high school level need to develop their TPACK competencies specifically within the context of digital Arabic vocabulary instruction, including the ability to design pedagogically effective Quizlet vocabulary sets, curate high-quality Arabic animated videos, and design Kahoot! sessions that develop understanding beyond mere memorization. Second, schools need to provide adequate and equitable digital infrastructure for all students, including stable WiFi

connectivity and a clear smartphone use policy that supports digital learning without creating unnecessary disruptions. Third, senior high school Arabic curricula need to explicitly integrate digital media use as a standard component of vocabulary instruction rather than treating it as an optional innovation dependent on individual teacher initiative. Systemic implementation supported by institutional policy commitment and sustained teacher capacity development is the prerequisite for the transformative potential of digital media in Arabic vocabulary learning to achieve broad and lasting impact across Indonesia's educational landscape.

Conclusion

This quasi-experimental study has provided robust empirical evidence that digital media utilization, specifically the combination of Quizlet, Arabic animated educational videos, and Kahoot!, significantly improves Arabic vocabulary mastery among senior high school students in Bandung City compared to conventional instructional methods. The statistically significant difference in gain scores between the experimental and control groups, with a large effect size of Cohen's $d = 0.93$, affirms that digital media integration in Arabic vocabulary instruction is not merely a pedagogically attractive innovation but a genuinely impactful intervention that produces measurable improvements in student learning outcomes. The particularly significant finding that low-initial-ability students benefited most from digital media further confirms the substantial potential of digital media as an instrument of democratic and inclusive educational differentiation. It is hoped that the findings of this study will encourage Arabic language teachers in Indonesian senior high schools to actively explore and integrate digital media into their vocabulary instructional practices, supported by strong institutional commitment to infrastructure provision, teacher capacity development, and the formulation of curriculum policies that accommodate digital transformation in Arabic language learning in a systematic, sustained, and pedagogically principled manner.

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