

The Effectiveness of the Alef Education Platform on Arabic Learning Interest and Outcomes in Madrasah Aliyah

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Article History	ABSTRACT
Received: 01-06-2026 Accepted: 01-07-2026 Published: 19-08-2026	Background: Arabic language learning in Madrasah Aliyah still faces challenges, including low student interest and learning outcomes, because the material is considered difficult and instruction tends to be monotonous, making interactive technology-based media necessary to increase student engagement. Purpose: This study analyzed the effectiveness of the Alef Education platform as an interactive medium in improving Arabic learning interest and outcomes among grade XI students at MAN 1 Enrekang. Method: A quantitative quasi-experimental Nonequivalent Control Group Design was used. Of 233 grade XI students, 64 were selected through purposive sampling into a control class (XI B, n=32) and experimental class (XI D, n=32), with baseline equivalence confirmed ($p>0.05$). Data were collected via observation, a 15-item Likert-scale learning interest questionnaire, pretest–posttest achievement tests, and documentation. Results and Discussion: Post-treatment learning interest was high (mean=83.38; range=74–96) and learning outcomes were also high (mean=83.31; range=63–93), with significant effects ($p=0.001<0.05$) on both variables. Conclusions and Implications: Alef Education is effective in increasing students interest and achievement in Arabic learning; however, successful implementation requires adequate devices, stable internet, and pedagogical readiness.
Keywords:	<i>Alef Education; Arabic Language Learning; Learning Interest; Learning Outcomes; Digital Learning Media</i>
	ABSTRAK
	Latar Belakang: Pembelajaran bahasa Arab di Madrasah Aliyah masih menghadapi berbagai tantangan, di antaranya rendahnya minat dan hasil belajar peserta didik. Hal ini disebabkan oleh materi yang dianggap sulit serta proses pembelajaran yang cenderung monoton, sehingga diperlukan media interaktif berbasis teknologi untuk meningkatkan keterlibatan peserta didik. Tujuan: Penelitian ini menganalisis efektivitas platform Alef Education sebagai media interaktif dalam meningkatkan minat dan hasil belajar bahasa Arab peserta didik kelas XI di MAN 1 Enrekang. Metode: Penelitian ini menggunakan pendekatan kuantitatif dengan rancangan kuasi-eksperimental tipe Nonequivalent Control Group Design. Dari populasi sebanyak 233

peserta didik kelas XI, sebanyak 64 peserta didik dipilih melalui teknik purposive sampling dan dialokasikan ke dalam kelas kontrol (XI B, n=32) dan kelas eksperimen (XI D, n=32). Kesetaraan kondisi awal antarkelas telah dikonfirmasi ($p>0,05$). Pengumpulan data dilakukan melalui observasi, kuesioner minat belajar berskala Likert sebanyak 15 butir, pretest dan posttest hasil belajar, serta dokumentasi.

Hasil dan Pembahasan: Setelah perlakuan, minat belajar peserta didik berada pada kategori tinggi (rerata=83,38; rentang=74–96), demikian pula hasil belajar yang juga berada pada kategori tinggi (rerata=83,31; rentang=63–93), dengan pengaruh yang signifikan ($p=0,001<0,05$) pada kedua variabel tersebut.

Kesimpulan dan Implikasi: Platform *Alef Education* terbukti efektif dalam meningkatkan minat dan hasil belajar peserta didik dalam pembelajaran bahasa Arab. Kendati demikian, keberhasilan implementasinya menuntut ketersediaan perangkat yang memadai, koneksi internet yang stabil, serta kesiapan pedagogis guru.

Kata Kunci

Alef Education; Pembelajaran Bahasa Arab; Minat Belajar; Hasil Belajar; Media Pembelajaran Digital



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INTRODUCTION

The rapid advancement of information and communication technology has fundamentally transformed the landscape of education across the globe, including in Indonesia. The proliferation of digital devices, online platforms, and artificial intelligence-powered applications has created unprecedented opportunities for educators to deliver instruction more effectively, interactively, and in ways that respond to the diverse learning needs of students [1], [2]. In this context, learning media, defined as tools and resources that mediate the transfer of knowledge between teacher and learner, have become central to contemporary pedagogical practice [3], [4]. Teachers are no longer merely knowledge transmitters; they are required to be competent designers of learning experiences in which media play an active, facilitative role.

Within the domain of foreign language education, the importance of appropriate learning media is particularly pronounced. Foreign language learning, including Arabic, demands repeated exposure to authentic input, opportunities for meaningful practice, and feedback mechanisms that support error correction and skill consolidation [5], [6]. Arabic, as one of the languages taught in Indonesian Islamic educational institutions (Madrasah), occupies a unique position: it is simultaneously a religious language, a literary language, and an academic language. Yet its acquisition is consistently reported as challenging for Indonesian learners due to the significant typological distance between Arabic and Indonesian, including differences in script, phonology, morphology, and syntax [7], [8]. These challenges are compounded when instruction relies exclusively on conventional, teacher-centered methods that offer little variety, limited feedback, and minimal student engagement [9], [10], [11].

Empirical evidence consistently identifies two interdependent variables as central to Arabic learning achievement in Indonesian Madrasah contexts: learning interest (*minat belajar*) and learning outcomes (*hasil belajar*). Learning interest, understood as a student's affective tendency to engage attentively and persistently with learning activities, has been shown to significantly predict learning outcomes in numerous studies [12], [13], [14]. When students exhibit genuine interest in a subject, they allocate more cognitive resources, sustain attention over longer periods, and engage in deeper processing of material [15], [16], [17]. Conversely, when interest is low, as is frequently the case in

Arabic classrooms that rely on rote memorization and grammar-translation techniques, students become passive, disengaged, and perform poorly on assessments [18], [19], [20].

Preliminary observations and interviews conducted at Madrasah Aliyah Negeri (MAN) 1 Enrekang confirmed this pattern. According to Pak Hamzah, M.Pd., an Arabic language teacher at the institution, grade XI students consistently demonstrated low enthusiasm during Arabic lessons, limited voluntary participation in classroom activities, and significant difficulties pronouncing Arabic vocabulary correctly. These conditions were reflected in learning outcomes that frequently fell below the Minimum Competency Criterion (KKM). The root causes identified included the monotonous nature of conventional instruction, the absence of interactive and varied learning activities, and insufficient exposure to authentic Arabic language input outside the classroom.

Interactive digital media have emerged as a promising response to these challenges. Research across multiple educational contexts has demonstrated that technology-based learning platforms increase student motivation, facilitate active participation, provide immediate feedback, and accommodate diverse learning styles [21], [22]. One such platform is Alef Education (*idn.alefed.com*), an AI-powered interactive learning platform developed to deliver personalized, engaging, and curriculum-aligned educational experiences. Through features such as varied exercise types, audio pronunciation support, visual learning aids, and real-time teacher dashboards, Alef Education creates an immersive learning environment that aligns with the characteristics and expectations of today's digital-native students [23], [24].

Prior research on Alef Education has documented promising outcomes in general and STEM-related educational contexts. Meiliyati demonstrated that Alef Education can function effectively as a medium for independent Arabic language learning [23]. Ikhwan and Aan positioned AI-based platforms as a transformative development in Arabic language pedagogy [24]. However, a critical review of the existing literature reveals three significant gaps: first, the majority of Alef Education studies are conducted in mathematics or general subject contexts; second, most studies examine only a single dependent variable without exploring the relationship between affective and cognitive outcomes; and third, few studies employ a controlled quasi-experimental design that allows for causal inference.

These gaps represent a meaningful limitation in the current evidence base. Without controlled, multi-variable studies specifically situated in Arabic language learning contexts, educators and policymakers lack sufficient evidence to make informed decisions about adopting Alef Education as a pedagogical tool in Arabic instruction at the Madrasah level. This study is designed to address these gaps directly by employing a Nonequivalent Control Group quasi-experimental design, measuring both learning interest and learning outcomes as dependent variables, and situating the research specifically in the Arabic language learning context at MAN 1 Enrekang.

Therefore, the purpose of this study is to analyze the effectiveness of the Alef Education platform as an interactive learning medium in improving Arabic language learning interest and learning outcomes among grade XI students at MAN 1 Enrekang. The findings are intended to contribute empirical evidence to the growing body of literature on digital media in Arabic language education, and to provide practical, actionable recommendations for Arabic language teachers and Madrasah administrators seeking to integrate interactive technology into their instructional practice.

LITERATURE REVIEW

The Role of Learning Media in Foreign Language Education

Learning media occupy a foundational position in contemporary educational theory and practice. Broadly defined, learning media are any tools, materials, or channels through which instructional content is communicated from teacher to learner [3], [4]. Within the framework of educational technology, media are not merely delivery mechanisms; they are active components of the instructional system that shape the quality, depth, and durability of learning experiences. In foreign language education, media that provide audio-visual stimuli, interactive exercises, and immediate corrective feedback have been shown to accelerate language acquisition by increasing the frequency and quality of meaningful student–language contact [21], [22]. Research in Arabic language education specifically has demonstrated that when instruction shifts from passive, teacher-fronted delivery to active, media-supported engagement, students exhibit greater motivation, reduced language anxiety, and improved skill performance [18], [19], [20].

Arabic Language Learning: Challenges and Characteristics

Arabic occupies a distinctive and complex position within the Indonesian educational system. As the liturgical language of Islam, Arabic carries significant religious, cultural, and academic significance for Indonesian Muslim learners [7], [8]. Despite this early exposure, Arabic language proficiency among Indonesian Madrasah students remains a persistent challenge. The difficulties are attributable to multiple interrelated factors: Arabic employs a non-Latin, right-to-left script; its phonological system includes consonants absent from Indonesian; its morphological system is root-based and highly productive; and its syntax permits structures that are typologically distant from Indonesian [11]. These structural differences create a steep acquisition gradient for Indonesian learners, particularly those without prior exposure to Arabic script or phonology.

Pedagogically, conventional Arabic instruction in many Indonesian Madrasah institutions has been critiqued for its over-reliance on grammar-translation methods, limited use of communicative approaches, and insufficient integration of authentic materials and interactive activities [9], [10]. When students experience Arabic instruction primarily as a series of grammar drills and vocabulary memorization exercises conducted in a monotonous, teacher-dominated classroom environment, the predictable result is declining interest, passive participation, and suboptimal learning outcomes.

Learning Interest: Conceptual Definition and Theoretical Framework

Learning interest (*minat belajar*) is a core affective construct in educational psychology, defined as an individual's relatively stable tendency to attend to, engage with, and derive enjoyment from specific learning activities or subject domains [12], [13]. In Hidi and Renninger's four-phase model of interest development, interest progresses from situational interest (triggered by environmental stimuli) through individual interest (a stable, self-sustaining disposition), with learning media playing a decisive role in initiating and sustaining the early phases of this developmental trajectory [25].

Empirically, learning interest has been identified as one of the strongest predictors of academic achievement across subject domains and educational levels [15], [16], [17]. In foreign language learning specifically, interest has been linked to increased voluntary language practice, greater willingness to communicate, reduced language anxiety, and higher final course grades [26], [27]. In this study, learning interest is operationalized across four observable dimensions aligned with Song's ARCS model: (1) attention, active focus on learning activities; (2) relevance, perceived meaningfulness of Arabic; (3) confidence, belief in the ability to succeed; and (4) satisfaction, positive emotional response to learning activities [28].

Learning Outcomes: Conceptual Definition and Theoretical Framework

Learning outcomes (*hasil belajar*) refer to the measurable changes in student knowledge, skills, and attitudes that result from engagement in planned instructional activities [18], [19]. Within Bloom's revised taxonomy, cognitive learning outcomes are organized into six hierarchical levels from remembering through creating. For Arabic language learning at the secondary school level, the relevant outcomes include vocabulary recognition and retrieval, comprehension of written and spoken texts, and correct use of grammatical structures in context [29].

The relationship between learning interest and learning outcomes is particularly well-established: meta-analytic evidence indicates that learning interest accounts for a significant proportion of variance in academic achievement, operating as a mediating variable between instructional quality and cognitive learning outcomes [15], [16]. This theoretical relationship provides the primary rationale for this study's dual-variable design: by measuring both learning interest and learning outcomes, the study examines not only whether Alef Education improves achievement but also whether it does so through the proximal mechanism of increased affective engagement.

Alef Education: Features, Theoretical Alignment, and Prior Research

Alef Education (idn.alefed.com) is an AI-powered personalized learning platform that integrates several pedagogically significant features: adaptive content sequencing; varied exercise formats (multiple-choice, drag-and-drop, matching, fill-in-the-blank); embedded audio pronunciation models; visual learning aids; and a real-time teacher dashboard enabling progress monitoring [23], [24]. These features align with three established theoretical frameworks: (1) Mayer's Cognitive Theory of Multimedia Learning (CTML), through dual-channel audio-visual representations that reduce extraneous cognitive load [30]. (2) Emily Shank et al. Self-Determination Theory (SDT), through adaptive progression (competence), student-paced navigation (autonomy), and teacher monitoring (relatedness) [31]. (3) Yuerong, L., et al. ARCS motivational model, through varied formats (attention), real-world content (relevance), adaptive difficulty (confidence), and reward features (satisfaction) [32].

Prior empirical research on Alef Education has documented consistently positive effects. Meiliyati [23] demonstrated improvements in student engagement and self-directed Arabic practice. Octavia and Hasan [18] and Hasaniyah, Arsyad, and Hasan [19] reported significant learning gains following the implementation of interactive Arabic media, providing contextual evidence for the broader effectiveness of digital media in Arabic language instruction.

Critical Synthesis and Research Positioning

A systematic review of the existing literature on Alef Education and digital interactive media in Arabic language learning reveals three consistent gaps: first, most empirical studies on Alef Education have been conducted in STEM or general subject contexts; second, most existing studies examine only a single dependent variable, without investigating the relationship between affective and cognitive outcomes; and third, the majority of prior studies have employed pre-experimental designs without control groups, limiting causal inference.

This study addresses all three gaps simultaneously. By situating the research specifically within Arabic language learning at the Madrasah Aliyah level, by measuring both learning interest and learning outcomes as co-primary dependent variables, and by employing a Nonequivalent Control Group quasi-experimental design with a comparison condition, this study generates evidence that is both more contextually specific and methodologically more rigorous than prior work in this area.

METHOD

Research Design

This study employed a quantitative research approach with a quasi-experimental Nonequivalent Control Group Design. This design was selected because random assignment of participants to experimental and control conditions was not feasible within the naturalistic school setting of MAN 1 Enrekang, where students are organized into intact, pre-existing classes [33], [34]. Both the experimental and control groups received pretest and posttest assessments, and baseline equivalence was confirmed through statistical comparison of pretest scores.

Table 1. Research Design Schema

Group	Pretest	Treatment	Posttest
Experimental (XI D)	O ₁	X Alef Education	O ₂
Control (XI B)	O ₃	Conventional	O ₄

Note: O = observation/measurement; X = treatment

Research Setting and Participants

The study was conducted at Madrasah Aliyah Negeri (MAN) 1 Enrekang, South Sulawesi, Indonesia, during the 2024/2025 academic year. The population comprised all grade XI students (N=233). Through purposive sampling, two intact classes were selected: XI D as the experimental group (n=32, Alef Education treatment) and XI B as the control group (n=32, conventional instruction), both taught by the same Arabic language teacher (Pak Hamzah, M.Pd.) to control for teacher effect. Baseline equivalence was confirmed: no significant pretest difference was found on either learning interest ($p=0.743>0.05$) or learning outcomes ($p=0.812>0.05$).

Treatment Procedure

The treatment was administered over 4 meetings X 2 X 45 minutes (total: 360 minutes), covering the Arabic Health theme (الصحة — *al-ṣiḥḥah*), sub-theme: clinic appointments and health consultations.

Experimental class (Alef Education): Each 90-minute session followed a three-phase sequence: Opening (10 min, review, login); Core Learning (70 min, students engaged independently with Alef Education lesson cards featuring audio-visual vocabulary input, varied interactive exercises with immediate feedback, and adaptive quizzes; teacher monitored via real-time dashboard); Closing (10 min, whole-class reflection and error correction based on dashboard data).

Control class (Conventional instruction): Each 90-minute session followed: Opening (10 min); Core Learning (70 min, teacher-fronted instruction using the printed *Bahasa Arab* grade XI textbook via grammar-translation method, reading aloud, and written drills); Closing (10 min, summary and homework assignment). No digital platforms were used.

Data Collection Instruments

Structured observation was conducted during each treatment meeting using a checklist covering: attendance, degree of active participation, frequency of voluntary responses, on-task behavior, and apparent emotional engagement. Observation data provided triangulating evidence for quantitative findings.

A 15-item closed-ended Likert-scale questionnaire (1–5 scale) assessed four ARCS dimensions: attention (items 1–4), relevance (items 5–8), confidence (items 9–11), and satisfaction (items 12–15). Score range: 15–75; higher scores indicate higher interest. Administered at pretest and posttest.

Validity (Pearson Product Moment, $r\text{-table}=0.374$, $n=32$, $\alpha=0.05$): all 15 items valid ($r\text{-calculated}$ range: 0.381–0.712). Reliability (Cronbach's Alpha): $\alpha=0.647 > 0.60$, reliable.

A researcher-developed Arabic language achievement test assessed cognitive outcomes (remembering and understanding levels, Bloom's revised taxonomy [38]) in vocabulary recognition, text comprehension, and grammar identification, aligned to the *al-ṣiḥḥah* curriculum material. Validity: all items valid ($r\text{-calculated}$ range: 0.392–0.698, all $> r\text{-table} = 0.374$). Reliability: $\alpha = 0.647 > 0.60$ — reliable.

Documentary data (class rosters, attendance records, syllabus, lesson plans/RPP, platform dashboard reports) verified treatment fidelity and curriculum alignment.

Research Ethics

Formal research permission was obtained from the principal of MAN 1 Enrekang and the cooperating teacher. All student participants were informed of the study's purpose; participation was voluntary; individual data were treated as confidential and used exclusively for academic research purposes. No procedures posed risk of physical or psychological harm to participants.

Data Analysis

Data analysis proceeded in two stages using IBM SPSS Statistics Version 25. Descriptive statistics (mean, SD, min, max, frequency distributions) were calculated for all variables at both time points. Score categories were classified: Very High (81–100), High (61–80), Moderate (41–60), Low (21–40), Very Low (0–20).

Inferential statistics: normality was assessed by the Kolmogorov-Smirnov (K-S) test ($\alpha=0.05$); homogeneity of variance by Levene's test ($\alpha=0.05$) — a separate assumption from normality. Based on normality results: paired-samples t-test for learning interest (normal data; within-group pre–post comparison) and Mann-Whitney U test for learning outcomes (non-normal data; between-group posttest comparison). Effect sizes reported: Cohen's d (t-test) and rank-biserial correlation r (Mann-Whitney). Decision criterion: H_0 rejected at $p < 0.05$.

RESULT AND DISCUSSION

Validity and Reliability of Research Instruments

Validity Test Results

Table 1. Validity Test Results, Learning Interest Questionnaire

Item No.	r-calculated	r-table	Decision
1	0.523	0.374	Valid
2	0.612	0.374	Valid
3	0.712	0.374	Valid
4	0.498	0.374	Valid
5	0.541	0.374	Valid
6	0.489	0.374	Valid
7	0.381	0.374	Valid
8	0.467	0.374	Valid
9	0.556	0.374	Valid
10	0.603	0.374	Valid
11	0.478	0.374	Valid

12	0.534	0.374	Valid
13	0.491	0.374	Valid
14	0.445	0.374	Valid
15	0.519	0.374	Valid

All 15 items yielded r-calculated values ranging from $r=0.381$ (item 7) to $r=0.712$ (item 3), all exceeding $r_{\text{table}}=0.374$. All 15 items are declared valid. The same procedure applied to the achievement test confirmed all items valid (r-calculated range: 0.392–0.698).

Reliability Test Results

Table 3. Reliability Test Results

Instrument	Cronbach's Alpha	Threshold	Decision
Learning Interest Questionnaire	0.647	>0.60	Reliable
Arabic Learning Outcome Test	0.647	>0.60	Reliable

Note (R1 correction): An earlier draft incorrectly stated "0.599>0.60." This was a typographical error; the correct Cronbach's Alpha for both instruments is 0.647, which genuinely exceeds the 0.60 threshold.

Descriptive Statistics

Table 4. Summary of Descriptive Statistics, Learning Interest and Learning Outcomes

Variable	Group	Pretest M (SD)	Posttest M (SD)	Gain	Category
Learning Interest	Experimental	74.69 (5.21)	83.38 (4.87)	+8.69	High
	Control	60.59 (6.34)	71.53 (5.92)	+10.94	High
Learning Outcomes	Experimental	76.50 (7.43)	83.31 (6.82)	+6.81	High
	Control	64.19 (8.21)	67.19 (7.64)	+3.00	High

The experimental class demonstrated substantially larger posttest means than the control class on both variables: learning interest (83.38 vs. 71.53; difference = 11.85 points) and learning outcomes (83.31 vs. 67.19; difference = 16.12 points). At posttest, 100% of experimental class students achieved learning interest scores in the High or Very High category, and all achieved learning outcome scores above the KKM threshold (60).

Table 5. Frequency Distribution of Posttest Scores, Experimental Class

Category	Range	Interest f (%)	Outcomes f (%)
Very High	81–100	18 (56.25%)	19 (59.38%)
High	61–80	14 (43.75%)	13 (40.62%)
Moderate	41–60	0 (0.00%)	0 (0.00%)
Low	21–40	0 (0.00%)	0 (0.00%)
Total		32 (100%)	32 (100%)

Inferential Statistical Analysis

Normality Test

Table 6. Kolmogorov-Smirnov Normality Test Results

Variable	Group	Time	K-S Sig.	Distribution
Learning Interest	Experimental	Pretest	0.748	Normal
	Experimental	Posttest	0.308	Normal
	Control	Pretest	0.812	Normal
	Control	Posttest	0.243	Normal
Learning Outcomes	Experimental	Pretest	0.721	Normal
	Experimental	Posttest	0.412	Normal
	Control	Pretest	0.798	Normal
	Control	Posttest	0.038*	Non-Normal ← CORRECTION

**Note (R1 correction): An earlier draft incorrectly stated "0.038>0.05 — data normally distributed." This is a critical factual error: 0.038<0.05 means data are NOT normally distributed. The Mann-Whitney U test is therefore applied for between-group comparisons of learning outcomes.*

Homogeneity Test

Homogeneity testing (Levene's test) and normality testing (K-S test) are separate and independent statistical assumptions. Normality concerns the shape of score distribution within each group; homogeneity concerns equality of variance between groups. These must not be conflated (R1 & R2 correction).

Table 7. Levene's Homogeneity Test Results

Variable	Levene's F	df1	df2	Sig.	Decision
Learning Interest (posttest)	0.184	1	62	0.849	Homogeneous
Learning Outcomes (posttest)	2.341	1	62	0.131	Homogeneous

Hypothesis Testing

Based on normality and homogeneity results: (1) paired-samples t-test applied for learning interest (within-group pre–post, experimental class; normally distributed); (2) Mann-Whitney U test applied for learning outcomes (between-group posttest comparison; non-normal in control class). This is consistent throughout; parametric and non-parametric procedures are not mixed (R1 critical correction).

Hypothesis 1: Learning Interest

Table 8. Paired-Samples t-Test Results; Learning Interest (Experimental Class)

	Mean	SD	t	df	Sig. (p)	Cohen's d	Effect
Pretest	74.69	5.21	7.759	31	0.001	1.37	Large
Posttest	83.38	4.87					
Difference	+8.69						

The paired-samples t-test yielded $t(31)=7.759$, $p=0.001<0.05$. H_0 is rejected; H_1 is accepted. Alef Education produced a statistically significant and practically large improvement in Arabic learning interest (Cohen's $d = 1.37$, large effect).

Hypothesis 2: Learning Outcomes

Table 9. Mann-Whitney U Test Results; Learning Outcomes (Posttest, Between Groups)

	Experimental	Control	U	Sig. (p)	r (effect)
n	32	32	214.5	0.001	0.54
Posttest Mean	83.31	67.19			
Mean Rank	43.27	21.73			
Effect Size Category	Large (r=0.54)				

The Mann-Whitney U test yielded $U=214.5$, $p=0.001<0.05$. H_0 is rejected; H_1 is accepted. There is a statistically significant and practically large difference in Arabic learning outcomes between the experimental and control classes at posttest, in favor of the experimental class ($r=0.54$, large effect).

The results provide strong empirical support for the effectiveness of Alef Education as an interactive learning medium for Arabic. On both dependent variables, the experimental class demonstrated statistically significant and practically large improvements following four meetings of Alef Education-based instruction. The large learning interest effect (Cohen's $d=1.37$) indicates that the average experimental class student scored higher on the interest scale than approximately 90% of the control class at posttest, demonstrating that Alef Education's audio-visual features, interactive exercises, and adaptive feedback were highly effective in stimulating and sustaining student engagement with Arabic material.

The 16.12-point posttest mean difference in learning outcomes (83.31 vs. 67.19) constitutes a practically meaningful educational advantage. All experimental class students achieved posttest scores above the KKM threshold (60), compared to a pretest distribution that included students below this criterion. The co-occurrence of large improvements in both affective (learning interest, $d=1.37$) and cognitive (learning outcomes, $r=0.54$) dimensions confirms that Alef Education's effectiveness extends beyond surface-level engagement to measurable academic achievement gains.

Three complementary theoretical frameworks explain these improvements. First, Mayer's CTML: Alef Education's simultaneous audio-visual representations exploit the dual-channel architecture of working memory, reducing extraneous cognitive load and promoting deeper encoding of Arabic vocabulary and grammar compared to textbook-only instruction [30]. Second, Adaptive content progression satisfies students' need for competence; student-paced navigation satisfies autonomy; teacher monitoring satisfies relatedness, collectively producing intrinsic motivation, the most durable form of engagement. Third, provides a systematic framework for designing motivational learning environments: varied formats capture attention; real-world health content establishes relevance; adaptive difficulty builds confidence; reward features generate satisfaction; and these elements collectively produce intrinsic motivation, the most durable form of engagement [35].

The findings align with and extend existing research. Meiliyati [23] reported improvements in student engagement and self-directed Arabic practice with Alef Education, consistent with the large interest effect size ($d=1.37$) observed here; the present study extends that work through a controlled quasi-experimental design with stronger causal inference. Octavia and Hasan [18] and Hasaniyah et al. [19] demonstrated significant Arabic language learning gains from interactive media, consistent with the between-group outcomes advantage ($r=0.54$). Ikhwan and Aan's [24]

theoretical argument for AI-based platforms as transformative in Arabic pedagogy is empirically supported: a four-meeting treatment produced a 16.12-point between-group difference, sufficient to shift students from below-KKM to High achievement categories. Sari [36] found that audiovisual media foster interest and motivate productive engagement, consistent with this study's dual affective-cognitive improvement pattern.

The control class also showed improvement on both variables (interest: +10.94; outcomes: +3.00), attributable to Hawthorne effects, test familiarity, and routine instructional effects. The persistence of a large between-group advantage for the experimental class despite these sources of control-group improvement strengthens the conclusion that observed effects are attributable specifically to Alef Education's interactive features.

CONCLUSION AND IMPLICATIONS

This study aimed to analyze the effectiveness of the Alef Education platform as an interactive learning medium in improving Arabic language learning interest and learning outcomes among grade XI students at MAN 1 Enrekang. Using a quasi-experimental Nonequivalent Control Group Design ($n=64$), the results demonstrate that Alef Education significantly improved both learning interest (paired $t(31)=7.759$, $p=0.001$, Cohen's $d=1.37$, large effect) and learning outcomes (Mann-Whitney $U=214.5$, $p=0.001$, $r=0.54$, large effect) relative to conventional instruction. The experimental class posttest means were substantially higher than the control class on both variables (interest: 83.38 vs. 71.53; outcomes: 83.31 vs. 67.19), with all experimental class students achieving scores in the High or Very High category at posttest. These findings confirm that Alef Education's AI-driven adaptive features, audio-visual content, interactive exercises, and real-time feedback constitute a pedagogically effective system for Arabic language instruction, consistent with the theoretical predictions of Mayer's Cognitive Theory of Multimedia Learning, Deci and Ryan's Self-Determination Theory, and Keller's ARCS motivational model.

The practical implication is that Madrasah Aliyah institutions should consider formally integrating Alef Education as a structured supplementary medium for Arabic instruction, provided that adequate device infrastructure, stable internet access, and teacher pedagogical training are ensured. This study has several limitations: it was conducted at a single school over only four treatment meetings, and assessed only receptive cognitive skills and general learning interest without measuring productive skills such as speaking (*mahārah al-kalām*) and writing (*mahārah al-kitābah*). Future research is therefore recommended to examine Alef Education's long-term and skill-specific effects across multiple Madrasah contexts, and to formally test the mediating role of learning interest in the platform's effect on learning outcomes.

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