



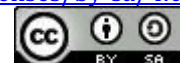
The Influence of Using YouTube Media on Accuracy in Pronunciation of the Hijaiyyah Mahasiswa Letters Biology

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Article Info:	ABSTRACT
Accepted: 23-12-2025 Approved: 06-01-2026 Published: 03-03-2026	<p>Background: Biology students face substantial challenges in accurately pronouncing Arabic hijaiyyah letters due to minimal phonological exposure and absence of equivalent sounds in Indonesian.</p> <p>Objective: This study evaluated the comparative effectiveness of audiovisual media versus conventional instruction in enhancing hijaiyyah pronunciation accuracy among Biology students.</p> <p>Method: This study employed a quantitative approach using a quasi-experimental design with a pretest-posttest control group configuration. Thirty third-semester Biology students at UIN Sunan Gunung Djati Bandung participated in a quasi-experimental study with pretest-posttest control group design. Participants were randomly assigned to experimental (audiovisual media, n=15) and control (conventional instruction, n=15) groups. The experimental intervention featured animated articulatory demonstrations and native speaker models. Assessment comprised oral tests of 28 hijaiyyah letters, structured observations, and documentation, analyzed using paired and independent t-tests. The experimental group's pronunciation accuracy increased from 52.67% to 78.33% (48.71% gain), substantially exceeding the control group's improvement from 50.87% to 58.40% (14.80% gain). Independent sample t-test confirmed significant differences ($t=9.086, p<0.001$).</p> <p>Findings and Implications: Experimental participants demonstrated superior performance across all pronunciation dimensions, particularly makharijul huruf accuracy (1.20-point advantage). Audiovisual media represents a significantly more effective pedagogical approach than traditional methods for developing Arabic pronunciation competence among science students.</p> <p>Conclusion: These findings support systematic integration of multimedia instruction in Arabic language curricula designed for non-linguistic majors, potentially transforming pronunciation pedagogy across diverse disciplinary contexts.</p>
Keywords: media audio visual; hijaiyyah letter f; accuracy of pronunciation; biology student.	

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INTRODUCTION

Language Arabic is one of the languages which has a complex phonology system and is different from the Indonesian language. Learning Arabic not only includes mastery of vocabulary and grammar, but also

accuracy in pronunciation of hijaiyyah letters which have unique characteristics in articulation points (makharijul huruf). The ability to pronounce hijaiyyah letters properly becomes an important foundation in learning Arabic, because errors in pronunciation can change the meaning of a word as a whole. In the context of higher education in Indonesia, Arabic has become a subject which is not exclusive to religious studies or Arabic linguistics programs only. Students from various scientific disciplines, including exact science programs like Biology, are also required or recommended to learn Arabic language.

This condition creates a unique pedagogical challenge, given that science students generally have minimal exposure to Arabic phonology and tend to experience difficulty in controlling pronunciation aspects, especially hijaiyyah letters which require special articulation exercises. According to the opinion of a number of experts, mastery of phonetic aspects in foreign language learning is very important for achieving good communicative competence. Good pronunciation learning will help students in understanding and producing sounds of the target language appropriately, so that they can communicate effectively. In the context of Arabic language learning, mastery of Hijaiyah letters is a fundamental stage that must be mastered before learning other aspects of the language.

Research in second language pronunciation has consistently demonstrated that targeted phonological instruction yields significant improvements in learner accuracy and intelligibility. These findings are directly applicable to the instructional challenge posed by Arabic hijaiyyah letters for Indonesian university students, whose first language phonological system does not encompass several of the distinctive articulatory positions required for accurate Arabic pronunciation. In the literature of language pedagogy, instructional media is recognized as having a crucial function in optimizing the process of knowledge transfer. Use of media in accordance with the characteristics of the material can transform abstract concepts into concrete representations, increase the engagement of learners, and accommodate diversity of learning modalities (Arsyad, 2016; Mayer, 2021).

The integration of multimedia in Arabic language pedagogy has received growing scholarly attention, particularly in Indonesian Islamic higher education settings. Ilmiani et al. (2020) demonstrated that interactive multimedia effectively addresses persistent learning problems in Arabic language instruction at Indonesian higher education institutions, finding that lecturers employed diverse digital platforms—including YouTube, e-learning systems, and animation-based software—to overcome both linguistic and motivational challenges faced by students. Corroborating this, Ahmadi &

Ilmiani (2020) further established that varied teaching media, including digital video content and online platforms, played a critical role in sustaining Arabic language instruction quality, particularly in contexts where traditional face-to-face interaction was constrained by institutional or situational limitations. At a broader institutional level, Eltahir et al. (2021) found that technology-mediated approaches in Arabic language courses at university level significantly enhanced student motivation, engagement, and academic performance compared to conventional instruction, underscoring the strategic pedagogical value of digital tools in Arabic language programs for diverse student populations.

Audio visual media, with the integration of auditory and visual elements, is considered to have high potential in learning Arabic because of its ability to activate multiple sensory channels simultaneously. Arabic phonology studies assert that pronunciation of hijaiyyah demands synergy between conceptual understanding about articulation mechanisms and repetitive systematic practice. Learners are not enough just to understand verbal descriptions about the position of articulatory organs like the tongue, lips, and contact points in the oral cavity, but also need demonstration models that can be observed and audio examples which can be imitated. This approach resonates with the principle of multisensory learning which advocates simultaneous activation of various sensory modalities for achieving optimal learning retention (Ahmadi & Ilmiani, 2020; Mayer, 2021).

The theoretical underpinning of multimedia-based instruction is further elaborated through cognitive load theory and the science of multimedia learning design. Sweller (2020) posited that effective instructional design must account for the inherent limitations of working memory capacity by strategically managing intrinsic load (complexity of the material itself), extraneous load (inefficiencies in instructional presentation), and germane load (cognitive effort directed toward schema construction). When applied to phonological learning, these principles suggest that well-designed audiovisual media can reduce extraneous cognitive load by providing clear, organized representations of articulatory mechanisms, thereby freeing cognitive resources for schema formation related to accurate sound production. Building upon this theoretical framework, Clark & Mayer (2023) synthesized extensive empirical evidence demonstrating that multimedia presentations incorporating synchronously aligned visual animations and audio narration produce superior learning outcomes compared to either single-modality or asynchronously presented instruction, providing a robust scientific basis for the design of audiovisual instructional resources for Arabic hijaiyyah articulation training.

Preliminary study conducted on Biology program students of semester III at UIN Sunan Gunung Djati identified significant problems in hijaiyyah articulation ability. From 30 students who became the subjects of early observation, around 70% showed pronunciation errors on a minimum of three hijaiyyah letters. The letters that do not have equivalents in the Indonesian phonology system such as ع (ain), ح (ha), ق (qaf), خ (kha), and غ (ghain) became the main difficulty points. These errors were especially caused by the students's inability to visualize and execute the movements of articulatory organs required, even though they had received verbal explanations and direct demonstrations from the teacher. The conventional learning method applied thus far, where the lecturer demonstrates pronunciation and students imitate, has not yet shown optimal results.

The emergence of YouTube as a pedagogical resource has generated considerable scholarly interest in its potential to support language learning, particularly for autonomous pronunciation development. Similarly, Kim & Kim (2021) in a qualitative investigation published in *Sustainability*, established that YouTube provides language learners with substantive benefits including flexible autonomous access to native speaker models, heightened intrinsic motivation, and meaningfully reduced anxiety in productive skill practice—factors of particular relevance to learners attempting to acquire phonologically complex target languages. Alobaid (2020), utilizing a smart learning environments framework published in *Smart Learning Environments*, further confirmed that YouTube-based multimedia resources exert a significant positive impact on language learners' fluency and productive skill development, attributing these gains to the platform's unique capacity to deliver contextually rich, multimodal input accessible at learner-controlled pacing and frequency—precisely the conditions required for effective articulatory motor skill development.

Contemporary developments in educational technology have generated increasing scholarly interest in digital and technology-mediated approaches to Arabic language instruction. Students often find it difficult to catch the details of articulatory organ movements and subtle differences between certain letters. Besides that, time constraints in classroom learning mean not all students get the opportunity to practice pronunciation individually with direct guidance from the lecturer. The adoption of audiovisual media in teaching hijaiyyah articulation can be projected to overcome these limitations. Such media can provide accurate and repeatable articulatory models, equipped with dynamic anatomical visualization, so that students can observe precisely how Arabic sounds are produced. Besides that, this media enables

autonomous learning outside scheduled class time, which has implications for the intensification of articulatory practice.

Several recent studies have explored the use of audiovisual media in Arabic language learning with various focuses and contexts. Rosyidi and Ni'mah showed that audiovisual learning media is effective in increasing kalam (speaking) skills of madrasah students with an average score increase of 15%. However, that research has not specifically analyzed the impact on hijaiyyah letter pronunciation accuracy at the phonetic level. Meanwhile, Munir proved that the use of audio-visual media can improve students' listening ability with effectiveness reaching 68%, but the study focused more on the receptive aspect (listening) rather than the productive aspect (pronunciation). Sari revealed that audio visual media was able to improve Arabic reading skills of Senior High School students with scores increasing from 65 to 82 ([Arsyad, 2016](#)) but this research was limited to the reading aspect and not on hijaiyyah letter pronunciation in isolation.

Zainuri in his study confirmed the importance of audio visual media in Arabic language learning in higher education, but his research was a literature study without experimental implementation on certain study subjects. Wahyuningsih conducted a study on audio visual media use in English language pronunciation learning and found significant improvement, but the characteristics of Arabic phonology which has a different Makharijul letter system from English make the findings not directly generalizable ([Arsyad, 2016](#)). Asyrofi and Junaedi applied a phonetics approach in Arabic language learning and found improvement in students' pronunciation ability, but that research had not yet used audio visual media as the main research instrument. Ramli, Mezah, and Thai analyzed Malay students' mastery of voice stress in mentioning Arabic words and found high error levels on certain letters, but that study was conducted in the context of Malay language learners in Malaysia which has different linguistic characteristics from Indonesian learners ([NA Ramli, 2016](#)).

Research specifically addressing the phonological challenges of hijaiyyah letters among non-native learners has begun to attract increasing empirical attention. Ainul Jannah, Erlina, and Ghazi studied the strategy of implementing multisensory approaches in Arabic language learning for students with phonological disorders. However, the subjects of their study were students with special needs, not science students ([Auliya Ainul Jannah et al., 2025](#)). Previous research has documented the effectiveness of audiovisual media in the context of language learning. However, investigations that explicitly explore the impact of audiovisual media on hijaiyyah articulation accuracy among non-Arabic major students, especially from a science

background, are still limited in quantitative terms. Therefore, this research has the urgency to fill this empirical gap and contribute to the development of evidence-based Arabic language pedagogical strategies for learners from non-linguistic science disciplinary backgrounds. Referring to the elaboration above, this study aims to identify the impact of implementing audiovisual media on the accuracy of hijaiyyah letter articulation among Biology program students.

This research is expected to offer alternative pedagogical solutions in Arabic language learning, specifically in the phonological dimension, and provide recommendations for more effective instructional media innovation in the future. More recent empirical evidence from Indonesian educational contexts further reinforces the effectiveness of audiovisual media specifically for Arabic language skill development. Taken together, these proximate contextual findings from Indonesian educational settings provide strong empirical support for the current study's rationale in employing audiovisual media as the primary instructional tool for Arabic pronunciation development among university-level Biology students.

Broader perspectives on language learning and instructional technology further corroborate the pedagogical value of media-rich pronunciation instruction. Zahra et al. (2024) emphasized that extensive and varied practice opportunities are fundamental prerequisites for phonological acquisition, noting that fluent and accurate sound production requires sufficient repetition for motor patterns to become automatized at a neurological level—a condition difficult to achieve within the constraints of scheduled classroom sessions alone, but substantially facilitated by digital instructional resources that enable learners to engage in self-directed practice at flexible times and frequencies. Godwin-Jones (2017) additionally underscored that emerging language learning technologies, including video-based instructional platforms, enable learners to exercise greater control over the pace, repetition, and focus of their practice, supporting the development of learner autonomy that is especially critical in procedural skill domains such as articulatory training. These converging theoretical and empirical perspectives establish a strong rationale for systematically investigating the effectiveness of audiovisual instructional media in Arabic pronunciation instruction for non-Arabic major university students in the Indonesian higher education context.

RESEARCH METHOD

Research Design

This study employed a quantitative approach using a quasi-experimental design with a pretest-posttest control group configuration. This

design was selected to examine the effect of audiovisual media on hijaiyyah letter pronunciation accuracy by comparing learning outcomes between the experimental group (receiving audiovisual media intervention) and the control group (receiving conventional instruction).

Participants

Population and Sampling

The study population consisted of 60 third-semester Biology students at UIN Sunan Gunung Djati Bandung enrolled in Arabic language courses during the 2024/2025 academic year. Purposive sampling was employed, with selection criteria based on comparable Arabic language competency levels as verified through a standardized placement test. A total of 30 students were selected and randomly assigned to two groups: the experimental group (n=15), which received instruction using audiovisual media, and the control group (n=15), which received traditional lecture-based instruction.

Participant Characteristics

All participants were non-Arabic major students from the Biology program with minimal prior exposure to Arabic phonology. Baseline competency assessments confirmed equivalence between groups prior to the intervention (experimental group $M=52.67$, $SD=6.84$; control group $M=50.87$, $SD=7.12$).

Research Variables

- a. Independent Variable: Audiovisual media implementation in hijaiyyah letter pronunciation instruction
- b. Dependent Variable: Pronunciation accuracy of the 28 hijaiyyah letters

Research Instruments

Oral Pronunciation Test

An individually administered oral assessment instrument was developed to evaluate pronunciation accuracy across 28 hijaiyyah letters. The test required students to pronounce each letter in three contexts: (1) as an isolated letter, (2) within words, and (3) within simple sentences. Pronunciation accuracy was evaluated using a structured rubric assessing three dimensions:

- a. Accuracy of articulation point (makharijul huruf): 1-4 scale
- b. Voice clarity: 1-4 scale
- c. Letter characteristic accuracy: 1-4 scale

All pronunciation tests were audio-recorded using a digital voice recorder for subsequent evaluation by a three-member assessment team consisting of Arabic language education experts.

Audiovisual Learning Media

Purpose-designed instructional videos were developed for each of the 28 hijaiyyah letters. Each video (2-3 minutes duration) featured:

- a. Anatomical animation of articulatory organs (tongue, lips, throat) during letter production
- b. Clear audio pronunciation by a native Arabic speaker
- c. Slow-motion sequences highlighting critical articulation movements
- d. Repetition of pronunciation in multiple contexts

Observation Checklist

A structured observation instrument was employed to document student engagement, responses to instructional media, and challenges encountered during the learning process. The checklist contained predetermined indicators aligned with the research objectives

Data Collection Procedures

The study was conducted over a two-week period and implemented in three sequential phases:

Phase 1: Preparation (Week 0)

- a. Development and validation of research instruments
- b. Preparation of audiovisual instructional materials
- c. Instrument reliability and validity testing
- d. Random assignment of participants to experimental and control groups
- e. Baseline equivalence verification

Phase 2: Implementation (Weeks 1-2)

Week 1:

- a. Administration of oral pronunciation pretest to both groups
- b. Introduction to hijaiyyah letters and articulation principles

Week 2:

- a. Experimental Group: Six 50-minute sessions utilizing audiovisual media with guided practice and independent review opportunities
- b. Control Group: Six 50-minute sessions using traditional lecture-demonstration methods
- c. Continuous observation and documentation of learning processes

Phase 3: Post-intervention Assessment (End of Week 2)

- a. Administration of oral pronunciation posttest to both groups
- b. Data compilation and preparation for analysis

Research Ethics

This research adhered to ethical standards in accordance with the guidelines established by the Research Ethics Committee of UIN Sunan Gunung Djati Bandung. Prior to data collection, informed consent was obtained from all participants. Students were informed about the research objectives, procedures, voluntary nature of participation, and their right to withdraw at any time without penalty. Participants were assured of confidentiality and anonymity; all data collected were used exclusively for research purposes and stored securely. No personally identifiable information was disclosed in the reporting of findings. The study posed minimal risk to participants, and all procedures were conducted with respect for participants' dignity and well-being.

Data Analysis

Data analysis was conducted using SPSS version 26.0 and involved the following statistical procedures:

Descriptive Statistics

Descriptive analysis included computation of central tendency measures (mean, median, mode), dispersion measures (standard deviation, range), and gain score percentages for both pretest and posttest assessments in each group.

Assumption Testing

Normality Test: The Shapiro-Wilk test was employed to verify normal distribution of data (criterion: $p > 0.05$ indicates normality). Homogeneity Test: Levene's test was used to assess variance homogeneity between groups (criterion: $p > 0.05$ indicates homogeneous variance).

Hypothesis Testing

- a. Paired Sample t-test: Used to compare pretest and posttest scores within each group to assess intra-group improvement.
- b. Independent Sample t-test: Used to compare posttest scores between experimental and control groups to determine inter-group differences in pronunciation accuracy gains.
- c. Non-parametric Alternative: If normality assumptions were violated, the Mann-Whitney U test would be employed as a non-parametric alternative.

Statistical Significance Criterion

Statistical significance was established at $\alpha = 0.05$. A p-value less than 0.05 would indicate that audiovisual media had a statistically significant effect on hijaiyyah pronunciation accuracy.

The methodological framework of this study is grounded in established best practices for second language research design and quantitative data analysis. Mackey & Gass (2015) identified the quasi-experimental pretest-posttest design with a control group as particularly well-suited for investigating instructional interventions in educational language learning contexts where full random assignment of participants across conditions may be constrained by institutional and administrative factors, arguing that this design provides a robust basis for causal inference when pre-intervention equivalence between groups is established and verified. With respect to the statistical procedures employed, Larson-Hall (2015) provided comprehensive methodological guidance for the application of parametric inferential tests, including the paired sample t-test for within-group pre-post comparisons and the independent sample t-test for between-group posttest comparisons, specifying the prerequisite statistical assumptions of normality and homogeneity of variance that were systematically verified in the present study through Shapiro-Wilk and Levene's tests prior to hypothesis testing.

RESULT AND DISCUSSION

Study This implemented in Program Studies Biology UIN Sunan Mountain Djatipada semester odd year academic 2024/2025. Study ongoing during 2 Sunday involving 30 student Which shared become group expedition (15 Students) and groups control (15 students).

Description Pretest Result Data and Posttest

Table 1. Descriptive Statistics Pretest and Posttest Results

Group	Test	N	Mean	Median	Standard Deviation	Min	Max
Experiment	Pretest	15	52.67	53.00	6.84	42	65
Experiment	Posttest	15	78.33	79.00	5.92	68	88
Control	Pretest	15	50.87	51.00	7.12	40	63
Control	Posttest	15	58.40	58.00	6.45	48	70

Source: Data Processed

Based on data Table 1, mean pretest score group recorded experiments 52.67, whereas group control 50.87. Number This indicates equivalence

baseline competency between the two groups before the intervention. Post-treatment, mean posttest score group experiment experience elevation substantive to 78.33, temporary group control only reach 58.40. Tourism Department outcome This show that group Those exposed to audio-visual media experience significant learning acceleration. superior compared to group Which following traditional methods.

Table 2. Percentage of Improvement in Ability

Group	Mean Pretest	Mean Posttest	Gain Score	Percentage
Experiment	52.67	78.33	25.66	48.71%
Control	50.87	58.40	7.53	14.80%

Source: Data Processed

Data on Table 2 show disparity improvement Which substantial between the two groups. The experimental group recorded a gain score of 48.71%, while the control group only achieved 14.80%. This gap in improvement indicates a substantial contribution audio visual media on acceleration ability articulation letter Islamic student, with effect learning Which far beyond conventional methods.

Prerequisite Test Analysis

Test Normality

Normality test done using Shapiro-Wilk test with criteria data distributed normal If mark significance > 0.05 .

Table 3. Test Results Shapiro-Wilk Normality

Data	Group	Statistics	df	Sig.	Conclusion
Pretest	Experiment	0.951	15	0.543	Normal
Pretest	Control	0.947	15	0.476	Normal
Posttest	Experiment	0.956	15	0.631	Normal
Posttest	Control	0.942	15	0.404	Normal

Source: Data Processed

Based on the Table 3, all data has value significance > 0.05 , so that can it was concluded that all data distributed normal and meet the requirements for done test parametric (t- test).

Test Homogeneity

Test homogeneity done use test Levene with criteria data homogeneous if mark significance > 0.05 .

Table 4. Test Results Homogeneity Variance

Data	Levene Statistics	df1	df2	Sig.	Conclusion
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Pretest	0.087	1	28	0.770	Homogeneous
Posttest	0.412	1	28	0.526	Homogeneous

Source: Data Processed

Table 4 show that mark significance for pretest and posttest > 0.05 , so that can concluded that variance second data group homogeneous

Hypothesis Testing

Test Paired Sample T-Test (Comparison) Pretest And Posttest in One Group)

Table 5. Test Results Paired Sample T-Test

Group	Mean Difference	Standard Deviation	t	df	Sig. (2-tailed)
Experiment	-25,667	4,521	- 21,979	14	0.000
Control	-7,533	3,887	-7,507	14	0.000

Source: Data Processed

The paired sample t-test output in Table 5 shows:

- Group experiment: t-value = -21,979 with significance level = 0.000 (< 0.05), confirm existence differentiation significant between score pretest and posttest
- Group control: t-value = -7,507 with significance level = 0.000 (< 0.05), Also show differentiation significant between score pretest And posttest

Although second group show in proof which is statistically significant, magnitude of change on experimental group (t = -21.979) far exceeding the control group (t = -7.507) which indicates that learning not in on the experimental group was substantially larger.

Independent Sample T-Test (Comparison of Posttest of Experimental Group and Control)

Table 6. Independent Test Results Sample T-Test

Test	Statistics	Mark
Levene's Test	F	0.412
	Sig.	0.526
Mean Difference Test (t-test)	t	9,086
	df	28
	Sig. (2-tailed)	0,000
	Mean Difference	19,933

Source: Data Processed

Output independent sample t-test (Table 6) show t-value = 9,086 with significance level 0.000 (< 0.05). Results This confirm existence difference which in a way statistics significant between posttest group scores experimental versus control group. Inference from findings. This is that implementation of the media audio visual give impact Which significant to improvement accuracy articulation hijaiyah letters student Biology.

Analysis Per Aspect Pronunciation

For understand more details of influence media audio v isual, following is analysis per aspect pronunciation letter Hijaiyah:

Table 7. Comparison of Scores per Aspect Pronunciation (Posttest)

Aspect	Experimental Group (Me an)	Control Group (Mean)	Difference
Accuracy Makharijul Huruf	3.47 (of 4)	2.27 (of 4)	1.20
Clarity Voice	3.53 (of 4)	2.53 (of 4)	1.00
Accuracy Characteristic Letter	3.33 (of 4)	2.13 (of 4)	1.20

Source: Data Processed

Table 7 show that group experiment superior in all pronunciation aspects Aspect accuracy Makharijul letter and accuracy characteristic letter show the difference the biggest (1.20 points), Which indicate that visualization organ deep articulation media audio visual very help student understand method pronounce letters with Correct.

Analysis of the Most Frequent Pronunciation Errors

Table 8. Letters Hijaiyyah with the Highest Error Rate (Pretest)

Letter	Experimental Group	Control Group	Type of Error General
ع (Ain)	87% Wrong	93% Wrong	Replaced with hamzah (ء) or alif
ح (Ha)	80% Wrong	87% Wrong	Replaced withha (ه)
ق (Qaf)	73% Wrong	80% Wrong	Replaced with coffee (ق)
خ (Kha)	67% Wrong	73% Wrong	Poor pronunciation in
غ (Ghain)	60% Wrong	67% Wrong	Replaced with ra (ر) echoing

Table 9. Error Correction After Posttest

Letter	Group Experiment (Posttest)	Group Control (Posttest)	Level of Improvement Experiment	Level Repair Control
ع (Ain)	27% Wrong	73% Wrong	60% improved	20% improved
ح (Ha)	20% Wrong	67% Wrong	60% improved	20% improved
ق (Qaf)	13% Wrong	60% Wrong	60% improved	20% improved
خ (Kha)	13% Wrong	53% Wrong	54% improved	20% improved
غ (Ghain)	7% Wrong	47% Wrong	53% improved	20% improved

Source: Data Processed

Tables 8 and 9 show that letters which do not have equivalents in Indonesian are the most difficult to pronounce. However, after using audiovisual media, the experimental group underwent very significant improvements (average 57.4% improvement), while the control group only experienced an average improvement of 20%. Research findings confirm that the implementation of audiovisual media has a significant impact on the accuracy of Hijaiyyah articulation of Biology students. Statistical evidence shows a significant difference between the experimental group (which used audiovisual media) and the control group (which used traditional methods), with t-value = 9.086 and p-value = 0.000 (< 0.05).

The disparity in ability improvement between the experimental group (48.71%) and the control group (14.80%) can be elaborated through cognitive and pedagogical theoretical frameworks. Audiovisual media operates on the dual-coding principle ([Mayer, 2021](#)), in which information is processed through two different sensory channels—auditory and visual—simultaneously. Cognitive multimedia theory postulates that learning achieves optimal effectiveness when material is presented in multimodal format, because it can maximize working memory processing capacity without causing cognitive overload. In learning Hijaiyyah articulation, the visual dimension is essential because it facilitates direct observation of the sound production mechanism: tongue configuration, lip aperture, and coordination of other articulatory organs. The audiovisual media implemented in this study displays dynamic anatomical visualization that illustrates articulatory movements in detail, thereby concretizing the previously abstract concept of makharijul letters. Simultaneously, the audio component provides an

authentic pronunciation model from a native speaker that can be reproduced repetitively to train students' phonetic perception.

In the context of learning hijaiyyah letter pronunciation, the visual aspect is very important because students can clearly see how the position of the tongue, lips, and other articulatory organs when producing certain sounds. The audiovisual media used in this study displays articulation organ animation which moves in detail, so that students can understand the previously abstract concept of Makharijul letters and make it more concrete and easy to understand. Meanwhile, the audio aspect provides a correct pronunciation model from native speakers, which can be heard repeatedly by students independently to train their phonetic hearing. Second, the use of audiovisual media gives students learning time flexibility. Unlike conventional methods that only rely on lecturer demonstrations in class with limited time, audiovisual media enables students to study independently outside of lecture hours. Students can repeatedly replay learning videos according to their needs, slow down video speed to observe details of articulatory movements, and practice intensively without time constraints.

This flexibility is very important given that pronunciation learning requires repeated exercise until the articulatory organ muscles are accustomed to producing the correct sounds. Third, per-aspect pronunciation analysis shows that the experimental group was significantly superior in Makharijul letter accuracy and letter characteristic accuracy. This indicates that the visualization served in audiovisual media is very effective in helping students understand appropriate articulation points for each letter. Students not only hear the produced sound, but also see how sounds are produced, so they can imitate more accurately. The aspect of voice clarity also shows significant increase, because students are trained to produce clear and distinctive sounds after hearing high-quality sentence models from native speakers.

The findings of this study also show that letters which do not have equivalents in Indonesian, such as ع (ain), ح (ha), ق (qaf), خ (kha), and غ (ghain), are the most difficult letters to pronounce by students. However, by using audiovisual media, the level of pronunciation errors for these letters can be dramatically reduced (average improvement of 57.4% in the experimental group compared to 20% in the control group). This shows that audiovisual media is very effective for learning complex letters that are unfamiliar to Indonesian students. The superiority of audiovisual media in this research also lies in its ability to present pronunciation with various contextual variations. Learning videos not only display letter pronunciation in isolation, but also in the context of words and sentences, so that students can understand how the

sounds of letters change or are influenced by surrounding letters (coarticulation). Understanding this coarticulation phenomenon is very important in achieving natural and accurate pronunciation.

The differential patterns of phonological improvement observed across hijaiyyah letters in this study can be situated within current theoretical frameworks of second language speech learning. Phonemes that are perceptually highly distinct from native language sounds—as in the case of Arabic pharyngeal and uvular consonants for Indonesian learners—present the greatest acquisition challenges, but are also the most amenable to improvement through explicit instruction that draws learner attention to articulatory features unavailable in their L1 phonological system. This theoretical perspective illuminates why letters such as ع (ain), ح (ha), ق (qaf), خ (kha), and غ (ghain), which have no phonological equivalents in Indonesian, demonstrated both the highest error rates at pretest and the most pronounced improvements following audiovisual intervention. The dynamic articulatory animations provided by the audiovisual media effectively operationalized the explicit articulatory feature instruction recommended by the SLM-r framework, giving learners precise visual and acoustic information about the distinctive production features of these challenging phonemes.

The finding that experimental group students demonstrated substantially greater flexibility and autonomy in their pronunciation practice behaviors corroborates established research on technology-enhanced self-directed language learning. This autonomy advantage is particularly significant in the domain of articulatory skill development, where principles of motor learning indicate that distributed practice across multiple sessions yields superior long-term retention and automatization compared to equivalent amounts of massed practice concentrated within formal class periods. The experimental participants in the present study could repeatedly access the instructional videos at their own pace, slow down playback to observe articulatory movements in detail, and practice intensively in self-selected practice sessions, affording them qualitatively different and more effective learning opportunities than were available to the control group relying exclusively on in-class demonstrations.

In contrast, the control group relied solely on live demonstrations from lecturers, which often make students feel less confident because they are afraid of making mistakes and do not have the opportunity to practice intensively outside the classroom. However, this research also finds a number of limitations in the use of audiovisual media. A number of students in the experimental group reported difficulties in accessing learning videos due to internet connection limitations or device constraints. Besides that, although

audiovisual media greatly assists in pronunciation learning, students still need direct feedback from the lecturer to correct errors they are not aware of. Therefore, the use of audiovisual media should be integrated with direct guidance from lecturers, not replacing the role of lecturers completely. From a cognitive architecture perspective, the effectiveness of the audiovisual intervention can also be analyzed in terms of the optimization of working memory resources during phonological skill acquisition.

Skulmowski & Xu (2022) demonstrated that in digital learning environments, the alignment of visual and auditory information streams in temporally contiguous presentations substantially reduces extraneous cognitive load compared to sequential or spatially separated multimodal presentations, thereby freeing working memory capacity for the germane cognitive processing associated with schema formation. Applied to hijaiyyah articulation learning, the synchronized anatomical animations and native speaker audio models in the instructional videos provided a coherent, integrated representation of each letter's production mechanism, enabling learners to construct accurate articulatory schemas more efficiently than would be possible through verbal descriptions or sequential observation followed by imitation. This cognitive load optimization is consistent with Sweller (2020) element interactivity framework, which predicts that complex motor learning tasks with high intrinsic load, such as mastering unfamiliar articulatory positions, benefit disproportionately from instructional designs that minimize extraneous cognitive processing demands.

The multidimensional pronunciation assessment employed in this study also reflects current consensus in second language pronunciation research regarding the multifaceted nature of oral phonological competence. The structured rubric employed in the present study, which assessed makharijul huruf accuracy, voice clarity, and letter characteristic accuracy as separate dimensions, is consistent with this multidimensional conceptualization and enabled the identification of the intervention's differential effects across these distinct aspects of pronunciation competence. The finding that the largest effect sizes were observed for the articulatory accuracy dimensions—particularly makharijul huruf precision and letter characteristic accuracy—suggests that the anatomical visualization component of the audiovisual media was especially effective in supporting the development of precise articulatory control, while also highlighting that sustained practice may be necessary for the full automatization of accurate productions at the level of voice clarity (Ramli & Y. T., 2016).

The broader pedagogical significance of these findings is also supported by the wider literature on technology integration in language education.

Ahmadi (2018) synthesized research on technology use in second language teaching and concluded that video-based instructional resources consistently rank among the most effective technological interventions for skill-based language domains requiring procedural knowledge development and perceptual training, particularly when they provide learners with authentic language models and explicit visual representations of the target skills. Furthermore, Ellis et al. (2020) argued that the most theoretically grounded approach to integrating pronunciation practice within comprehensive language instruction involves embedding phonological training within meaningful communicative tasks, suggesting that future implementations of audiovisual pronunciation media for hijaiyyah should ideally be embedded within communicative task sequences that require learners to deploy accurate letter productions in meaningful Arabic language contexts.

The findings of this research have several important implications for Arabic language pedagogy in higher education, especially for non-Arabic students. First, audiovisual media can function as an effective supplementary tool to enhance hijaiyyah articulation competence. Second, there is an urgency to develop more diverse instructional media tailored to the needs of students from various disciplinary backgrounds. Third, there is a necessity for Arabic instructors to elevate technological literacy in leveraging educational technology to create more effective and engaging learning experiences (Arsyad, 2016). The results of this research are also in line with a number of previous studies which show the effectiveness of audiovisual media in foreign language learning. However, this research makes a special contribution in the context of Arabic language learning for science students who have their own characteristics and challenges. Science students generally have more visual and systematic learning styles, so audiovisual media which displays diagrams and articulation organ animations is very much in keeping with their learning preferences (Mayer, 2021; Sugiyono, 2020).

CONCLUSION

Based on comprehensive data analysis, this research establishes that audiovisual media significantly improves Arabic pronunciation accuracy among non-linguistic students. Independent sample t-test results ($t=9.086$, $p<0.001$) confirm statistically significant differences favoring the experimental group, which demonstrated 48.71% improvement compared to 14.80% in the control group. Specifically, experimental participants advanced from 52.67% to 78.33% accuracy, while control participants progressed from 50.87% to 58.40%. The intervention's effectiveness was particularly pronounced for phonetically challenging letters without Indonesian

equivalents (ع, ح, ق, خ, غ), where experimental group error reduction reached 57.4% versus 20% in controls. Pronunciation dimension analyses revealed experimental group superiority across all assessed aspects, especially makharijul huruf precision (1.20-point differential).

These outcomes validate audiovisual media's pedagogical advantages: simultaneous multisensory information delivery, autonomous learning flexibility, and intensive practice opportunities. Practical implications necessitate curriculum integration of audiovisual resources in Arabic language programs for science students. Educational institutions require adequate technological infrastructure investment, while instructors should systematically incorporate multimedia tools. Future investigations should explore sustained retention patterns, disciplinary transferability, and comparative effectiveness of advanced technologies including virtual reality, augmented reality, and gamified learning applications.

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REFERENCES

- Ahmadi, & Ilmiani, A. M. (2020). The Use of Teaching Media in Arabic Language Teaching during COVID-19 Pandemic. *Dinamika Ilmu*, 20(2), 307–322. <https://doi.org/10.21093/di.v20i2.2515>
- Ahmadi, M. R. (2018). The use of technology in English language learning: A literature review. *International Journal of Research in English Education*, 3(2), 115–125. <https://doi.org/10.29252/ijree.3.2.115>
- Alobaid, A. (2020). Smart multimedia learning of ICT: role and impact on language learners' writing fluency— YouTube online English learning resources as an example. *Smart Learning Environments*, 7(1), 24. <https://doi.org/10.1186/s40561-020-00134-7>
- Arsyad, A. (2016). *Learning Media*. PT RajaGrafindo Persada.
- Auliya Ainul Jannah, I., Erlina, E., & Ghazi, F. (2025). Implementation of Multisensory Strategies in Arabic Language Learning for Students with

- Phonological Disorders: A Literature Review. *Kalamuna: Jurnal Pendidikan Bahasa Arab Dan Kebahasaaraban*, 6(2), 243–259. <https://doi.org/10.52593/klm.06.2.03>
- Clark, R. C., & Mayer, R. E. (2023). *E-learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning*. Wiley.
- Ellis, R., Skehan, P., Li, S., Shintani, N., & Lambert, C. (2020). *Task-Based Language Teaching: Theory and Practice*. Cambridge University Press.
- Eltahir, M., Alsalhi, N., & Al-Qatawneh, S. (2021). The impact of game-based learning (GBL) on students' motivation, engagement and academic performance on an Arabic language grammar course in higher education. *Education and Information Technologies*. <https://doi.org/10.1007/S10639-020-10396-8>
- Godwin-Jones, R. (2017). Scaling up and zooming in: Big data and personalization in language learning. *Language Learning & Technology*, 21(1), 4–15.
- Ilmiani, A. M., Ahmadi, A., Rahman, N. F., & Rahmah, Y. (2020). Multimedia Interaktif untuk Mengatasi Problematika Pembelajaran Bahasa Arab. *Al-Ta'rib: Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya*, 8(1), 17–32. <https://doi.org/10.23971/altarib.v8i1.1902>
- Kim, S., & Kim, H.-C. (2021). The Benefits of YouTube in Learning English as a Second Language: A Qualitative Investigation of Korean Freshman Students' Experiences and Perspectives in the U.S. *Sustainability*, 13(13), 7365. <https://doi.org/10.3390/su13137365>
- Larson-Hall, J. (2015). *A Guide to Doing Statistics in Second Language Research Using SPSS and R*. Routledge. <https://doi.org/10.4324/9781315775661>
- Mackey, A., & Gass, S. M. (2015). *Second Language Research*. Routledge. <https://doi.org/10.4324/9781315750606>
- Mayer, R. E. (2021). *Multimedia Learning* (3rd ed.). Cambridge University Press.
- Ramli, N. A., & Y. T., C. M. (2016). *Malay students' mastery of voice stress in saying the Arabic words from the aspect of intensity*.
- Skulmowski, A., & Xu, K. M. (2022). Understanding Cognitive Load in Digital and Online Learning: A New Perspective on Extraneous Cognitive Load. *Educational Psychology Review*, 34(1), 171–196. <https://doi.org/10.1007/s10648-021-09624-7>
- Sugiyono. (2020). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Sweller, J. (2020). Cognitive load theory and educational technology. *Educational Technology Research and Development*, 68(1), 1–16. <https://doi.org/10.1007/s11423-019-09701-3>

Zahra, N. A., Lubis, R. A., Siregar, P. A. S., Parinduri, A. I., & Lubis, Y. (2024). Phonology: Examining The Sound System From An Educational Perspective. *Jurnal Ilmiah Nusantara (JINU)*, 1(4).