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Enhancing *Arabic* Listening Comprehension through Interactive Audiovisual Total Physical Response: A Quasi-Experimental Study in *Madrasah Ibtidaiyah*

Giska Enny Fauziah[1]*, Aulia Rohmawati[2], Amorita Azza Khikmatul Mardhiyah[3], Maziyyatul Muslimah[4]

[1,3]*Pendidikan Guru Madrasah Ibtidaiyah, Institut Agama Islam Badrus Sholeh Kediri, Indonesia*
[2]*Pendidikan Guru Madrasah Ibtidaiyah, Universitas Islam Negeri Syekh Wasil Kediri, Indonesia*
[4]*School of Education, The University of Queensland, Australia*
giskaenny@gmail.com, aulia@uinkediri.ac.id, amoritaa729@gmail.com, m.muslimah@student.uq.edu.au
**Corresponding Author*

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Abstract

Arabic listening comprehension is a foundational skill in Islamic elementary education, yet traditional instruction often fails to engage young learners effectively. This study examined the effectiveness of integrating digital media with the Total Physical Response (TPR) method to improve the Arabic listening skills of Madrasah Ibtidaiyah students. The study used a quasi-experimental pretest-posttest control-group design with 60 fifth-grade students, equally divided into an experimental group receiving digital media-supported TPR and a control group receiving conventional instruction. Data were collected using a validated listening comprehension test and structured classroom observations. To control for baseline differences in this non-randomized design, we conducted a one-way Analysis of Covariance (ANCOVA), using pretest scores as the covariate. The results demonstrated a statistically significant difference in posttest scores between the groups, $F(1, 57) = 24.816$, $p < .001$, with a large effect size ($\eta^2p = .303$). Observational data further revealed higher engagement and faster physical responsiveness in the experimental group. These findings indicate that the synergy between kinesthetic movement and digital audiovisual input effectively reduces cognitive load and facilitates the decoding of Arabic phonology. The study concludes that digital media-supported TPR offers a viable, context-specific instructional model for elementary Arabic education. Future research should examine the long-term retention of these gains and isolate the independent pedagogical contribution of digital tools relative to the embodied TPR method.

Keywords: *Arabic listening comprehension; Total Physical Response; digital media; quasi-experimental; ANCOVA; Madrasah Ibtidaiyah*

INTRODUCTION

Arabic listening skills are a foundational pillar of communicative competence and religious literacy in *Madrasah Ibtidaiyah*, Indonesia's Islamic elementary school system. This competency matters beyond linguistic acquisition; it serves as a gateway through which young learners access authentic Islamic texts, understand religious instruction, and participate meaningfully in communal religious practices. Despite this critical role, pedagogical practices in elementary Arabic listening instruction continue to face persistent, interconnected challenges. These include

limited exposure to authentic oral input, phonological interference arising from the substantial phonetic distance between Indonesian and Arabic, and a prevailing reliance on teacher-centered methodologies that prioritize passive reception over active comprehension (Ibda et al., 2023; Lathifah et al., 2026; Maimunah et al., 2019). As a result, students remain disengaged from the listening process and fail to develop the auditory discrimination and interpretive fluency essential for functional Arabic comprehension.

These pedagogical shortcomings persist not merely because of methodological inertia; rather, they reflect a deeper misalignment between instructional approaches and the developmental characteristics of elementary learners, who require concrete, experiential, and physically engaging modes of learning. Total Physical Response (TPR), the embodied language teaching method developed by James Asher, offers a theoretically coherent response to this misalignment. Grounded in embodied cognition, TPR posits that language comprehension is strengthened when learners respond to verbal commands through physical movement, activating multiple cognitive pathways and reducing affective barriers that impede language acquisition (Itmeizeh & Ibnian, 2022; Kuo et al., 2014). Empirical investigations have consistently demonstrated TPR's efficacy in enhancing vocabulary retention and listening comprehension among young learners, including those in special needs contexts where conventional instruction proves inadequate (Sari et al., 2021; Tran & Bui, 2026). The method's emphasis on comprehension before production aligns with the trajectory of first language acquisition. It offers learners a low-anxiety entry point into the target language, fostering a more positive affective filter, as proposed in Krashen's (1982) Affective Filter Hypothesis (see also Faouri et al., 2025).

METHOD

Research Design

This study employed a quantitative approach utilizing a quasi-experimental pretest-posttest control-group design. Specifically, the non-equivalent control group design was selected because it best fits educational research in intact classrooms where full randomization of students is neither feasible nor ethically justifiable (Chang et al., 2022; Huang et al., 2023). The design involved two non-randomly assigned groups: an experimental group that received the Arabic listening instruction through a digital media-supported Total Physical Response (TPR) intervention, and a control group that received conventional teaching methods. This design was chosen to allow for a rigorous comparison of instructional efficacy while acknowledging the realities of the *Madrasah Ibtidaiyah* school structure, where intact classes must remain together.

Participants and Sampling

This study's population comprised all fifth-grade students enrolled at a private *Madrasah Ibtidaiyah* located in Kediri, East Java, Indonesia. The school was selected as it represents a typical Islamic elementary institution in the region with an active Arabic language curriculum and accessible digital classroom infrastructure. A non-probability purposive sampling technique was employed to select two intact classrooms based on specific inclusion criteria: (1) students were currently enrolled in the fifth-grade Arabic language curriculum; (2) the classes exhibited

comparable baseline academic profiles; and (3) institutional permission was granted. The final sample consisted of 60 students, evenly divided into an experimental group (n = 30) and a control group (n = 30). Although the use of intact classes (purposive sampling) inherently introduces potential selection bias—a limitation acknowledged in this study—the groups were statistically homogeneous based on pretest scores prior to the intervention.

Instruments and Validation

Data were collected using two primary instruments: an Arabic listening comprehension test and a classroom observation sheet. The listening test was developed based on prevailing curriculum indicators. It included multiple-choice and short-answer items designed to assess students' ability to decode phonological features, comprehend verbal instructions, and identify main ideas. To ensure content validity, the test items were subjected to expert judgment involving two Arabic language education lecturers and one experienced *Madrasah Ibtidaiyah* teacher.

The observation sheet was utilized to document students' active participation, responsiveness, and engagement during the learning process. To ensure the reliability of the primary instrument, a pilot test was conducted with a separate group of 30 fifth-grade students who shared similar characteristics with the target sample. Because test items comprised objective multiple-choice questions scored dichotomously (0 or 1) alongside structured short-answer items, the internal consistency was evaluated using Cronbach's Alpha (yielding a coefficient identical to the Kuder-Richardson Formula 20 for dichotomous data). The pilot test yielded an overall reliability coefficient of .84, exceeding the standard threshold of 0.70 and confirming acceptable internal consistency for measuring Arabic listening comprehension (González-Alonso et al., 2020).

Data Collection Procedures

The research was conducted over six weeks during the first semester of the academic year. Before the intervention, both groups were administered a pretest to establish their baseline Arabic listening proficiency. The experimental group then underwent the digital media-supported TPR intervention, while the control group continued with their conventional teacher-centered instruction. Both groups were taught by the same Arabic language teacher to control for teacher effect, and both received identical instructional materials regarding Arabic vocabulary and commands, ensuring that the only differing variable was the pedagogical approach. The digital media-supported TPR intervention was operationalized using interactive audiovisual materials—specifically, curated thematic Arabic animated video vignettes and native-speaker audio recordings projected via an interactive smartboard, complemented by a digital flashcard application (e.g., Quizlet/Wordwall interactive modules).

The instructional sequence followed a consistent protocol for each session: (1) the teacher presented the target Arabic vocabulary through digital audiovisual input; (2) the teacher delivered verbal commands in Arabic (e.g., '*Iftah al-bab*' — open the door) supported by dynamic visual cues; (3) students executed the physical movements individually and in groups; and (4) the digital platform provided immediate auditory feedback to reinforce correct comprehension.

After the six-week treatment period, both groups completed an identical posttest. To ensure observation objectivity, two independent observers conducted structured classroom observations using a predetermined 4-point Likert rubric; inter-rater reliability between the two observers was assessed, yielding an acceptable agreement level (Cohen's $\kappa = .82$).

Data Analysis

The quantitative data obtained from the pretest and posttest were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Before testing the hypotheses, we conducted prerequisite tests for parametric statistics, including the Kolmogorov-Smirnov test for normality and Levene's test for homogeneity of variance. To determine whether posttest scores differed significantly between the experimental and control groups, we initially considered an independent-samples t-test. However, because the design was non-randomized and necessitated controlling for baseline differences (pretest scores), a one-way Analysis of Covariance (ANCOVA) was employed. ANCOVA is a more robust analytical strategy for quasi-experimental designs because it adjusts posttest scores for baseline differences, reducing bias from pre-existing variation between groups (Zhang et al., 2023).

The pretest score served as the covariate, group (experimental vs. control) as the fixed factor, and the posttest score as the dependent variable. We verified the ANCOVA assumptions, including linearity of the covariate and homogeneity of regression slopes. The statistical significance level was set at $\alpha = .05$. To provide a comprehensive evaluation of the practical significance of the findings, we also calculated partial eta-squared (η^2p) as the effect size measure. This approach moves beyond reporting p-values alone and addresses the need for effect size estimates in high-impact educational research (Lei et al., 2022; Liu et al., 2022).

Ethical Considerations

This study strictly adhered to standard ethical research protocols. Before data collection, formal permission was obtained from the school principal and the local education authority. Informed consent was secured from the parents or guardians of all participating students, who were fully briefed on the nature of the study. It was explicitly communicated that participation was entirely voluntary and that students retained the right to withdraw at any time without academic consequence. To ensure confidentiality and anonymity, students' names were replaced with numerical codes during data entry and analysis, and all collected data were stored securely and used exclusively for research purposes.

RESULTS AND DISCUSSION

Results

The empirical findings of this study are presented sequentially to answer the research questions and address the hypotheses established in the introduction. The data comprise pretest and posttest scores from both the experimental and control groups, along with observational data recorded during the instructional sessions. The analysis focuses on descriptive statistics, tests of

statistical assumptions, and inferential analysis using Analysis of Covariance (ANCOVA) to determine the effect of the digital media-supported Total Physical Response (TPR) intervention.

Descriptive Statistics and Baseline Equivalence

Before the intervention, both groups completed a pretest to assess baseline Arabic listening comprehension. The experimental group (n = 30) recorded a pretest mean of 62.13 (SD = 6.42), while the control group (n = 30) recorded a pretest mean of 61.87 (SD = 6.15). The minimal difference of 0.26 points between the two groups suggests baseline equivalence. An independent-samples t-test confirmed that this pretest difference was not statistically significant, t (58) = 0.160, p = .873, indicating that the experimental and control groups were statistically homogeneous prior to the intervention. After the six-week instructional period, posttest scores diverged markedly. The experimental group achieved a posttest mean of 82.47 (SD = 5.88), whereas the control group reached a posttest mean of 71.25 (SD = 7.14). The experimental group showed a mean gain of 20.34 points, compared with 9.38 points in the control group. Table 1 summarizes the descriptive statistics for both groups.

Table 1

Descriptive Statistics of Arabic Listening Comprehension Scores by Group

Group	n	Pretest M	Pretest SD	Posttest M	Posttest SD	Mean Gain
Experimental (Digital TPR)	30	62.13	6.42	82.47	5.88	20.34
Control (Conventional)	30	61.87	6.15	71.25	7.14	9.38

Maximum possible score = 100. M = Mean; SD = Standard Deviation.

To illustrate the score distributions more clearly, Figure 1 displays a split violin plot with overlaid individual observations, depicting score density, median values, and variance across assessment periods. As illustrated, while the control group exhibited a modest upward shift, the experimental group demonstrated a pronounced upward displacement and tighter clustering within higher score bands, indicating that the digital TPR intervention benefited a broader spectrum of learners.

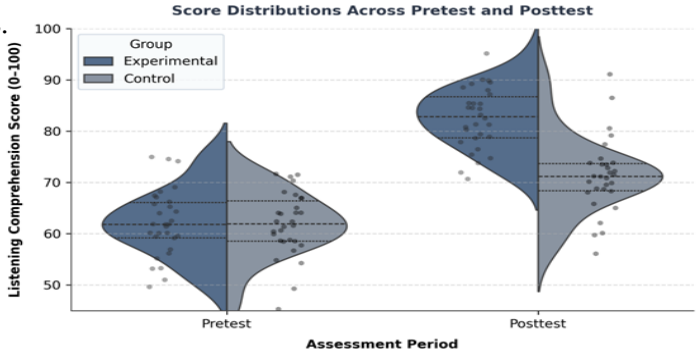


Figure 1

Split Violin Plot of Arabic Listening Comprehension Scores Across Pretest and Posttest

Note: The plot displays individual data points, median values, and score density distributions for the experimental and control groups.

Assumption Testing and Inferential Analysis

Before proceeding to the primary inferential analysis, the data were subjected to prerequisite testing. The Kolmogorov-Smirnov test indicated that the posttest scores for both groups were normally distributed ($p = .142$ for the experimental group; $p = .201$ for the control group). Levene's test yielded $F = 1.845$, $p = .180$, confirming equal error variance across groups. Furthermore, the homogeneity of regression slopes was tested to ensure that the covariate (pretest scores) did not interact significantly with the treatment group, $F(1, 56) = 0.674$, $p = .415$, satisfying the primary assumption for ANCOVA.

Given the quasi-experimental design, we used a one-way ANCOVA to test the hypothesis, with posttest scores as the dependent variable, instructional method as the fixed factor, and pretest scores as the covariate. The analysis revealed a statistically significant main effect of the instructional method on Arabic listening comprehension after controlling for pretest differences, $F(1, 57) = 24.816$, $p < .001$. The effect size, measured by partial eta-squared (η^2p), was .303, which, according to Cohen's guidelines, represents a large practical effect. This indicates that approximately 30.3% of the variance in the posttest scores can be attributed to the digital TPR intervention (see Table 2). The covariate-adjusted marginal means illustrating this difference are displayed in Figure 2.

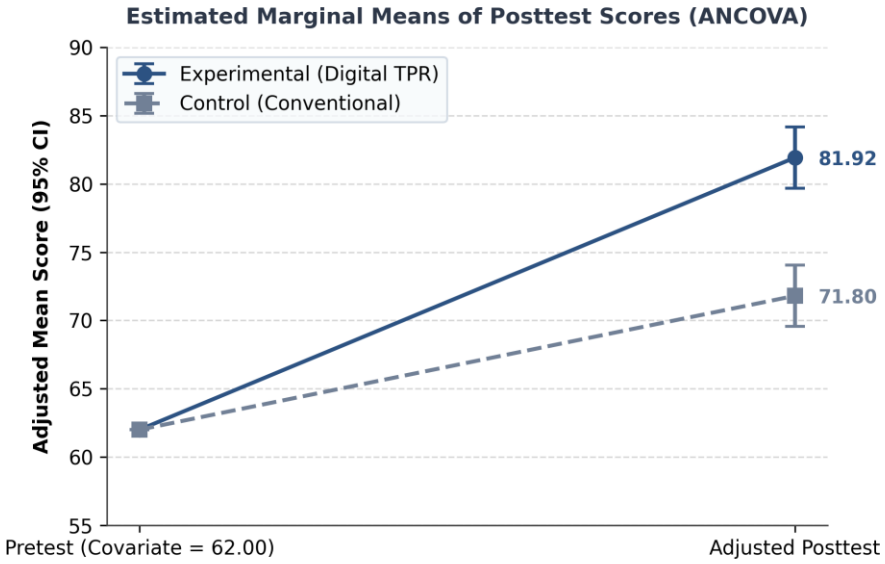


Figure 2

Estimated Marginal Means Plot for Posttest Scores Controlling for Pretest

Note: The plot illustrates the covariate-adjusted mean differences, showing the greater improvement of the digital media-supported TPR group relative to the conventional group.

Table 2
Results of Analysis of Covariance (ANCOVA) for Posttest Scores

Source	df	F	p-value	η²p	Adjusted Posttest M	95% CI
Pretest (Covariate)	1	18.423	< .001	.244	-	-
Group (Intervention)	1	24.816	< .001	.303	-	-
Estimated Marginal Means						
Experimental Group (Digital TPR)	-	-	-	-	81.92	[79.68, 84.16]
Control Group (Conventional)	-	-	-	-	71.80	[69.56, 74.04]

Note: df = degrees of freedom; F = F-statistic; η²p = partial eta-squared (effect size); CI = confidence interval for adjusted means. Adjusted means are evaluated at the combined sample pretest grand mean of 62.00. Group df = 1, 57.

Classroom Observation Findings

The quantitative outcomes were corroborated by the structured classroom observations conducted by two independent observers. Observers recorded students' active participation, responsiveness to verbal commands, and overall engagement using a 4-point Likert scale rubric. In the experimental group, the average engagement score during the final three sessions was 3.65 out of 4.00 (SD = 0.42), compared to 2.40 out of 4.00 (SD = 0.58) in the control group. The experimental group consistently showed higher physical responsiveness; for instance, when they heard the Arabic command '*Iftah al-bab*' (open the door), 86.7% of students (n = 26) in the experimental group acted correctly within three seconds, compared with 53.3% (n = 16) in the control group. Additionally, observers noted that students in the experimental group showed fewer hesitant behaviors and more often asked the teacher to replay the audiovisual materials, indicating high intrinsic interest and a reduced affective filter during the listening tasks.

Discussion

The findings show that integrating digital media into the Total Physical Response (TPR) method yielded a statistically significant and practically meaningful improvement in fifth-grade *Madrasah Ibtidaiyah* students' Arabic listening comprehension. The ANCOVA results, controlling for baseline differences, showed that the experimental group outperformed the control group with a large effect size ($\eta^2p = .303$). This finding warrants deeper theoretical and pedagogical examination, moving beyond statistical significance to understand the mechanisms that drove this outcome.

The Synergy of Embodied Cognition and Digital Multisensory Input

The experimental group's superior performance likely stems from the synergy between embodied cognition and multisensory digital input. Conventional TPR relies heavily on the teacher's verbal commands and physical modeling. However, in large classes, students often lose

visual focus, and the teacher cannot provide immediate corrective feedback to every learner (Huang & Wang, 2023; Wang et al., 2019). This study addressed this limitation by integrating digital media through interactive audiovisual materials (animated videos and digital flashcards) projected on a smartboard.

From the perspective of Dual Coding Theory, this intervention allowed students to process information through two distinct but interconnected cognitive channels: the verbal channel (Arabic commands) and the visual channel (digital animations and gestures) (Ivone & Renandya, 2026). When students physically executed the commands (e.g., "*Iftah al-bab*"), the motoric action served as a third layer of encoding. This tri-modal encoding—audio, visual, and kinesthetic—reduces the cognitive load associated with processing unfamiliar Arabic phonology. As Mahmoud et al. (2026) noted, multisensory learning environments significantly reduce variability in learning outcomes, ensuring that even students with lower initial proficiency can access the meaning of the target language without direct translation.

Comparison with Previous Empirical Studies

This study's findings align with and extend the existing body of literature on technology-enhanced TPR. Kuo et al. (2014) previously demonstrated that motion-sensing technology could improve TPR retention by ensuring individualized feedback. However, their study focused heavily on vocabulary acquisition in an EFL context. This study extends this finding by showing that digital media-supported TPR is equally, if not more, effective for developing *listening comprehension* in the specific context of Arabic as a foreign language. Arabic presents unique phonological challenges, such as emphatic consonants and pharyngeal sounds, that are difficult to mimic without consistent auditory modeling (Lathifah et al., 2026). The digital audio component provided consistent, authentic modeling, bridging the gap between physical movement and accurate auditory discrimination.

Furthermore, these results corroborate Alsaiari (2025), who noted that digital storytelling enhanced Arabic listening skills by providing contextualized input. While Alsaiari relied solely on passive viewing and listening, the current study actively engaged students through physical responses. This active engagement is crucial because it turns passive digital consumption into an active, constructivist learning process. The observation data corroborate this, showing that 86.7% of students (n = 26) in the experimental group executed commands correctly within three seconds, compared to only 53.3% (n = 16) in the control group. This rapid response time indicates that the digital cues helped students bypass the cognitive translation process, leading to automaticity in listening comprehension.

Addressing the Affective Filter and Student Engagement

Beyond cognitive mechanisms, the affective domain played a significant role in the intervention's success. Observation data showed that students in the experimental group had higher engagement scores (M = 3.65) and often asked the teacher to replay the digital audiovisual materials. This finding supports Krashen's Affective Filter Hypothesis, which posits that low anxiety and high motivation facilitate language acquisition (Faouri et al., 2025).

The conventional control group, which relied on textbook-based audio and teacher-led drills, showed significantly lower engagement (M = 2.40). This disparity suggests that the novelty and interactivity of the digital media reduced the students' anxiety and fear of making mistakes. When students move and interact with a screen, the learning environment becomes gamified and playful, shifting the focus from performance evaluation to active participation (Syamsudin et al., 2025). As Almelhes (2024) noted in a systematic review, gamification and interactive digital elements significantly improve learner motivation and participation in Arabic language learning. The digital TPR intervention effectively capitalized on this by turning listening comprehension tasks into a dynamic, game-like physical activity.

Conceptual Framework of the Intervention

To synthesize the findings and illustrate the intervention's theoretical mechanism, Figure 3 presents the conceptual framework derived from this study. The framework shows how the independent variable (Digital Media-Supported TPR) influences the dependent variable (Arabic Listening Comprehension) through the mediating variables of reduced cognitive load, multisensory encoding, and a reduced affective filter.

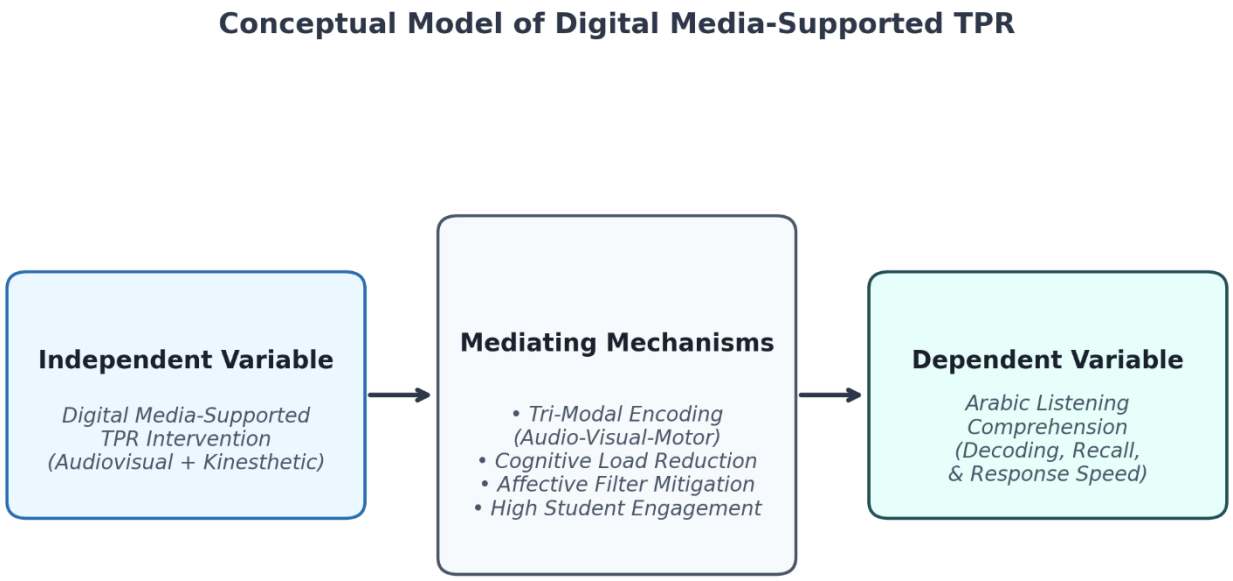


Figure 3

Conceptual Model of Digital Media-Supported TPR for Arabic Listening Comprehension

Note: Conceptual model illustrating the mechanism by which digital media-supported TPR enhances Arabic listening comprehension. The intervention stimulates visual, auditory, and kinesthetic channels, reducing cognitive load, thereby facilitating the comprehension of complex Arabic phonological inputs.

Practical Implications for Islamic Education

The practical implications of this study extend beyond the immediate classroom. For *Madrasah Ibtidaiyah* institutions, the findings suggest that integrating digital media into TPR is not merely a technological novelty, but a pedagogically sound strategy for addressing the chronic challenges of Arabic listening instruction. Teachers should use simple digital tools—such as

animated flashcards or short audiovisual clips—to supplement their physical command activities.

However, as Astutik et al. (2019) cautioned, teachers often lack a deep theoretical understanding of TPR, leading to mechanical application. Therefore, professional development programs for Islamic education teachers must focus not only on using digital tools but also on *why* they work, emphasizing the principles of embodied cognition and Dual Coding. Furthermore, schools must address infrastructural disparities. While this study used an interactive smartboard, similar results could be achieved with standard projectors or even large tablet screens, provided the audio is clear and the visual cues are explicitly linked to the target phonemes.

Limitations and Future Research Directions

Despite the robust statistical findings, this study has several limitations that must be acknowledged to contextualize the results appropriately. First, the quasi-experimental design relied on intact classes (purposive sampling), which inherently introduces the potential for selection bias, even though ANCOVA was used to control for pretest differences. The relatively small sample size (N = 60) also limits the generalizability of the findings to *Madrasah Ibtidaiyah* students in Indonesia.

Second, the study did not measure long-term retention (delayed posttest). It remains unclear whether the gains in listening comprehension are durable over time or merely a novelty effect of the digital media. Third, the study did not isolate the digital media's independent contribution from the TPR method itself; it tested the efficacy of the *combined package*. Future research should employ a three-arm design (Conventional TPR, Digital Media-only, and Digital Media-supported TPR) to disentangle these effects. Finally, future studies should consider incorporating biometric data (e.g., eye-tracking or galvanic skin response) to objectively measure cognitive load and engagement, providing a more nuanced understanding of how young learners process digital and kinesthetic stimuli simultaneously.

CONCLUSION

This study aimed to determine whether integrating digital media into the Total Physical Response (TPR) method improves Arabic listening comprehension among fifth-grade *Madrasah Ibtidaiyah* students. Based on the quasi-experimental investigation and the rigorous statistical analysis using ANCOVA, the empirical evidence strongly indicates that the digital media-supported TPR intervention yielded a statistically significant and practically meaningful improvement in students' listening comprehension compared to conventional instruction. The large effect size indicates that combining physical movement with digital audiovisual cues provides a robust pedagogical mechanism for helping young learners decode and comprehend Arabic verbal input.

This research's primary theoretical contribution is empirically validating a tri-modal encoding model—integrating auditory, visual, and kinesthetic inputs—in the context of

elementary Arabic language acquisition. While previous studies have explored TPR in EFL contexts or digital media in isolation, this study bridges the gap by demonstrating how the synergy between embodied cognition and digital scaffolding can effectively manage cognitive load and reduce the affective filter for young Arabic learners. The findings suggest that the digital component is not merely a technological novelty but actively compensates for traditional TPR's limitations by providing consistent auditory modeling and immediate visual context, which are crucial for navigating Arabic's phonological complexities.

However, readers must interpret this study's conclusions within its methodological limitations. The reliance on non-random, purposive sampling and a relatively small sample size (N = 60) limits the generalizability of the findings to the broader *Madrasah Ibtidaiyah population*. Furthermore, because the study evaluated the combined package of TPR and digital media, it does not isolate the independent contribution of the digital tools from the physical TPR method itself. The absence of a delayed posttest also means the study cannot verify long-term retention of the listening gains. These constraints highlight the need for cautious causal interpretation and position the findings as preliminary yet highly promising evidence.

To build on these findings, future research should address the identified limitations in several concrete ways. First, a longitudinal study with a delayed posttest is needed to determine whether listening comprehension gains are durable and transferable to unfamiliar Arabic texts. Second, researchers should employ a multi-arm experimental design—comparing conventional TPR, digital media-only instruction, and digital media-supported TPR—to isolate the specific added value of each component. Finally, future investigations should replicate this intervention across diverse geographical and institutional contexts within the Indonesian Madrasah system, using larger random samples. By addressing these avenues, Islamic education stakeholders can develop more standardized, evidence-based, and technologically adaptive Arabic listening curricula that align with the cognitive characteristics of 21st-century young learners.

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DECLARATIONS

Declaration Category	Statement Details
Use of AI Statement	The authors declare that no generative Artificial Intelligence (AI) tools were used in the writing, data analysis, or content synthesis of this manuscript. Grammarly was used exclusively for English grammar checking and language proofreading.

Declaration Category	Statement Details
Authors' Contributions	All authors contributed substantially to this manuscript. Giska Enny Fauziah contributed to research conceptualization, methodology design, field data collection, and drafting the initial manuscript. Aulia Rohmawati contributed to formal data analysis (ANCOVA), statistical interpretation, and literature review. Amorita Azza Khikmatul Mardhiyah contributed to instrument validation, classroom observation data collection, and manuscript formatting. Maziyyatul Muslimah contributed to theoretical framework synthesis, critical manuscript revision, and final proofreading. All authors have read and approved the final version of the manuscript.
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Conflict of Interest	The authors declare that there is no conflict of interest regarding the publication of this article.

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