Arabic Listening Media in Indonesian Boarding Schools: A Needs Analysis for an AI-Enhanced 3D-Audiovisual and Kahoot!-Supported Design Framework

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Abstract
Arabic listening instruction in Indonesian boarding schools requires learning media that provide contextual oral input, visual support, and interactive assessment. This study analysed the needs of Arabic listening instruction (mahārah al-istimā') as a basis for formulating a needs-based design framework for AI-enhanced audiovisual media with 3D animation and Kahoot!-supported formative assessment. A qualitative-descriptive needs analysis supported by simple quantitative data was conducted at a private Islamic boarding school in Indonesia. Participants consisted of 51 tenth-grade students, one Arabic teacher, and two student interview informants. Data were collected through observation, semi-structured interviews, questionnaires, and document analysis. Findings indicate challenges related to limited learning time, diverse proficiency levels, restricted device access, audio limitations, limited contextual visualisation, and insufficient interactive assessment. Questionnaire percentages represent students' perceived needs and preferences, not evidence of the effectiveness of AI, 3D animation, or Kahoot! in improving listening skills. Students reported positive perceptions toward contextual visualisation (80.4 percent), 3D animation (82.3 percent), AI support (62.8 percent), Kahoot!-based evaluation (74.5 percent), and flexible access (80.4 percent). These findings contribute to a needs-based design framework that prioritises clear oral input, contextual visuals, segmented materials, teacher-controlled implementation, and formative feedback. Future studies should develop, validate, and experimentally test the proposed media framework.

1. Introduction

Teaching Arabic in secondary schools faces two main challenges: developing students' communication skills and adapting to digital learning. As Arabic is taught for religious, cultural, and academic purposes, students must master four core skills. Among these, mahārah al-istimā' (listening) is particularly important because exposure to spoken language supports vocabulary acquisition, sentence structure comprehension, and recognition of various communication contexts. Listening is complex, requiring students to distinguish sounds, interpret meaning, follow the speaker, and connect information to context. Therefore, audio recordings alone are insufficient for effective listening instruction. Students require contextualised input, repetition, and targeted comprehension checks (Alzamil, 2021; Mayer, 2024).

The demand for context-appropriate learning materials increases in schools where Arabic instruction is constrained by time, resources, or regulations. While digital media are often viewed as tools to enhance motivation and engagement, their effectiveness depends on alignment with students' learning needs. Research on animations, interactive videos, multimedia, and digital assessment tools indicates that technology supports learning when visuals, audio, text, and feedback are integrated with clear instructional objectives (Barut Tugtekin & Dursun, 2022; Hanif et al., 2023; Mayer, 2024; Wang & Tahir, 2020). In listening lessons, audiovisual media help students link spoken language to visual cues such as situations, objects, facial expressions, and actions. However, if media are developed without considering students' needs, device accessibility, sound quality, or content relevance, they risk becoming superficial technical additions that do not address core learning challenges (Mayer, 2024; Barut Tugtekin & Dursun, 2022).

Previous research identifies three main trends in the development of listening materials. First, studies emphasise the need for clear, sequential, and accessible spoken input to help students understand meaning, not just recognise sounds (Alzamil, 2021; Mayer, 2024). Second, research on animated videos and audiovisual tools demonstrates that visuals enhance attention and comprehension when they reinforce the lesson's context rather

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than serve as decoration (Barut Tugtekin & Dursun, 2022; Mayer, 2024; Ridha et al., 2025; Rokhani et al., 2024). Third, studies on Kahoot! and gamification show that game-based quizzes increase engagement, promote quick thinking, and provide valuable feedback in language learning (Kohnke & Moorhouse, 2022; Wang & Tahir, 2020). However, most of this research evaluates media after implementation and does not address how user needs influence the design of AI-powered audiovisual tools.

This challenge is particularly significant in boarding schools, where digital learning environments differ from those in regular schools. Boarding schools may have basic equipment such as teachers' computers, projectors, speakers, Wi-Fi, and computer labs, but students are often prohibited from using personal devices, especially phones, due to school policies. As a result, digital media must be tailored to the school's specific context rather than simply adopting the latest technology. It is therefore essential to assess the needs of students and teachers, available resources, and effective use of visuals, clear audio, and interactive assessments in teaching mahārah al-istimā'.

To address these challenges, this article examines the learning needs for mahārah al-istimā' at a private Islamic boarding school in Indonesia to guide the design of AI-assisted audiovisual media. The scope is limited to needs analysis and design implications, excluding product validation or post-implementation effectiveness testing. This approach ensures the focus remains on the initial phase of media development, where field challenges, user needs, and institutional constraints inform design decisions. The objectives are to identify challenges in listening comprehension, the needs of students and teachers, limitations in instructional materials, and design considerations for developing 3D-AI-animated videos integrated with Kahoot! assessments. The article argues that digital media for istimā' learning should be developed based on data-driven pedagogical needs, rather than assuming that new technology automatically enhances learning.

2. Method

2.1. Study Design

This study uses a needs-analysis design using a qualitative-descriptive approach, supported by quantitative descriptive data (Mirfan et al., 2024). This design was chosen because the article focuses on identifying learning needs for mahārah al-istimā', not on testing media effectiveness after implementation. The needs analysis was conducted as the initial stage in developing 3D-AI-animated videos integrated with Kahoot!-based evaluation (Putra, 2026). The research therefore focuses on identifying learning barriers, student characteristics, limitations of teaching materials, access to audio media, facility readiness, and audiovisual media design needs. With this design, field data acts as the basis for formulating media design decisions appropriate for the boarding school context.

2.2. Participants and Sampling

The study was conducted in 10th-grade Arabic language learning at a private Islamic boarding school in Indonesia. The participants consisted of 51 tenth-grade students who completed the needs-assessment questionnaire, one Arabic teacher as the main instructional informant, and two tenth-grade students as supplementary interview informants. The two student interviewees were selected purposively because they represented different levels of Arabic listening experience identified during classroom observation, allowing the researchers to obtain contrasting perspectives regarding learning difficulties, media expectations, and accessibility constraints.

2.3. Instruments

The research instruments consisted of classroom observation guidelines, semi-structured interview guidelines, a needs-analysis questionnaire, and a document-analysis form. The observation guidelines recorded learning conditions, student participation, teaching techniques, media use, supporting facilities, technical problems, and the classroom setting during listening activities. The interview guide explored teachers' and students' experiences regarding time constraints, audio difficulties, contextual visualisation, device-usage policies, and expectations for new media. The needs-analysis questionnaire used a five-point Likert scale strongly disagree, disagree, neutral, agree, and strongly agree to assess students' perceptions of contextual visualisation, 3D animations, AI support, Kahoot!, flexible access, motivation, understanding, and retention (Fadhilah et al., 2024). A document review was conducted on textbooks, learning materials, teaching modules, and supporting documents related to the teaching of mahārah al-istimā'. Table 1 presents the data sources and their analytical focus to clarify how each source contributed to identifying instructional needs.

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Table 1. Data Sources and Analytic Focus in the Needs Analysis

Data source	Analytic focus	Function in the article
Classroom observation	Student participation, media use, facilities, technical disturbances, and listening instruction patterns	To confirm actual classroom conditions and barriers to media use
Teacher and student interviews	Audio constraints, time limitations, device policy, proficiency variation, and expected media features	To deepen the pedagogical and technical reasons behind media development needs
Needs-analysis questionnaire	Contextual visualisation, 3D animation, AI, Kahoot!, flexible access, motivation, and understanding	To show simple quantitative tendencies toward students' expected media features
Document analysis	Textbook, barcode audio access, learning themes, and suitability of materials for istimā'	To identify the gap between available materials and contextual listening practice needs

2.4. Instrument Validity and Reliability

Instrument validity and reliability were addressed to ensure the consistency and credibility of the needs-analysis data. Content validity was examined by three experts in Arabic language education and instructional media who reviewed the alignment, clarity, and relevance of questionnaire items using a five-point validation scale. The questionnaire obtained an average validity score of 4.53/5 (90.6%), indicating a highly appropriate category after minor revisions. Reliability testing was conducted using Cronbach's alpha on the questionnaire responses from 51 students, producing an alpha coefficient of 0.87, which indicates good internal consistency. Although this study did not test media effectiveness, instrument reliability remained necessary because needs analysis depends on the accuracy and consistency of participants' reported perceptions. Data credibility was further strengthened through triangulation across observations, interviews, questionnaires, and documents.

2.5. Procedures

Data collection was conducted in four sequential stages. The first stage involved classroom observation to identify teaching practices related to mahārah al-istimā', media use, supporting facilities, student participation, and technical obstacles in listening activities. The second stage consisted of semi-structured interviews with the Arabic teacher and two 10th-grade students to examine the observation findings in greater depth, particularly time constraints, audio quality, visual needs, variations in students' prior abilities, and device-usage rules. The third stage involved distributing a needs-assessment questionnaire to 51 10th-grade students to gauge their perceptions of the media features they required (Magfiroh & Murtini, 2026). The fourth stage was a document analysis of teaching materials and supporting resources to examine the availability of audio and barcode access, the suitability of materials for listening activities, and any restrictions on contextual visualisation within the learning resources.

The data were analysed using thematic analysis and descriptive statistics. Observation notes, interview transcripts, and document records were initially coded through open coding to identify meaningful statements related to learning barriers, learner characteristics, material limitations, and media requirements. The codes were then compared and grouped into broader themes: instructional constraints, learner needs, technology-access conditions, and design implications. Theme determination was conducted through repeated comparison between data sources to ensure consistency. Questionnaire responses were analysed using percentages to describe perceived needs. The final interpretation distinguished empirical findings from researcher-generated design recommendations; therefore, proposed features such as AI support, 3D animation, and Kahoot! represent design implications rather than evidence of effectiveness.

The data were analysed through a four-step process combining thematic analysis and simple descriptive statistics. First, data from observations, interviews, and documents were reduced and coded. Second, the codes were grouped within themes of needs, including instructional constraints, student characteristics, media limitations, device access, quality of instructional materials, and design implications. Third, questionnaire data were analysed using response percentages to identify trends in students' needs regarding contextual visualisation, 3D animations, AI support, Kahoot!, flexible access, motivation, and grasp and retention (Wang & Tahir, 2020). Fourth, findings from all sources were compared to identify reliable patterns of needs (Nguyen et al., 2020). The final stage translated the results into media design recommendations, such as content segmentation, clear audio, contextual visualisation, usage scenarios that do not rely on personal devices, and Kahoot!-based formative assessments.

3. Results and Discussion

The needs analysis showed that challenges in Arabic listening instruction within the boarding school context are complex and go beyond the absence of digital media. Data obtained through observation, interviews, questionnaires, and document analysis consistently indicated that students require more than isolated audio exposure. The primary constraints identified were limited instructional time, diverse levels of prior Arabic

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proficiency, restricted access to smartphones, acoustic disturbances in classrooms, inaccessible textbook audio, limited contextual visualisation, and insufficient opportunities for interactive formative assessment (Yudiawan et al., 2026). These factors affect students' reception of spoken input, teachers' management of listening practice, and the assessment of comprehension after listening activities. Therefore, the data show that AI-enhanced audiovisual media should be developed not only as technological innovations but as targeted responses to the instructional, technical, and material needs identified in the field.

Observation and interview data identified time allocation as a major constraint in Arabic listening instruction. Arabic classes occurred only once per week for each group, and students' prior proficiency levels varied considerably. Some students possessed basic knowledge of Arabic, while others lacked familiarity with essential vocabulary and sentence patterns. This difference lessened opportunities for repeated listening practice, strategic pauses, and contextual reinforcement within the limited classroom time. As a result, instructional media should provide short, segmented, and focused learning units to support students' progression from vocabulary recognition to sentence and discourse comprehension. The data also indicate that listening activities require multiple exposures and scaffolding, as students continued to experience difficulties with the pace of audio recordings and with differentiating Arabic sounds.

Boarding school policies additionally shaped media design requirements. Observation data showed that the school had basic instructional technology, including a teacher's computer, a projector, a speaker, stable Wi-Fi, and a computer laboratory. However, students' access to personal digital devices, especially smartphones, was restricted during classroom sessions. This restriction created challenges, as several digital learning features, such as textbook audio accessed through barcode scanning, relied on smartphone applications. Furthermore, the classroom's location between other rooms caused acoustic disturbances, reducing acoustic clarity during listening activities. These outcomes indicate that instructional media should be accessible through teacher-controlled devices, classroom projection, or computer laboratory resources. They should deliver clear audio, controlled pacing, and embedded listening input without requiring student smartphone access.

Questionnaire findings showed students' perceived needs for contextual and interactive listening media. A significant proportion of students agreed or strongly agreed with the inclusion of contextual visualisation (80.4%) and 3D animation (82.3%). Support for AI integration reached 62.8%, which indicates students' openness toward AI-assisted media features rather than evidence that AI improves listening achievement. Similarly, Kahoot!-based interactive quizzes (74.5%) and flexible access (80.4%) reflect perceived requirements for formative support and accessibility. These percentages should therefore be interpreted as indicators of learner needs that inform future media design, not as measurements of instructional effectiveness. Table 2 summarises the main quantitative trends from the questionnaire.

Table 2. Primary Trends Identified in the Questionnaire Regarding the Needs for Arabic Listening Media

Aspect of need	Dominant response	Design interpretation
Contextual visualization of Arabic conversations	80.4% agree and strongly agree	The video should display speakers, setting, objects, gestures, and communicative situations that directly support the spoken input.
3D animation	82.3% agree and strongly agree	Animation should function as contextual representation, not as decorative visual display.
AI support	62.8% agree and strongly agree	AI should be positioned as a media-production support tool under teacher and developer control.
Kahoot!-based interactive quiz	74.5% agree and strongly agree	Kahoot! is relevant as formative assessment after students listen to audiovisual input.
Flexible access	80.4% agree and strongly agree	The media should be accessible through teacher devices, computer laboratories, or teacher-managed links.
Motivation and learning activity	78.4% agree and strongly agree	Interactivity should support attention, participation, and feedback, not merely competition.

The open-ended questionnaire responses and teacher interviews further clarified what students and teachers expected from the media. Students suggested using AI-supported media, 3D animation, subtitled videos, podcasts, and interactive games to reduce boredom during listening lessons. Some students emphasised the requirement for direct practice, real-life conversations, repeated exposure to vocabulary, slower delivery, greater variation in activities, and light entertainment to sustain concentration. The teacher also stated that ideal istimā' media should include images, use *lahjah fuṣḥā*, be thematic and meaningful, and be adjusted to students' proficiency level. These responses strengthen the quantitative trend by showing that students' demand for visual and interactive media was not purely a preference for attractive technology, but a response to specific listening difficulties.

Document analysis showed that the existing textbook already provided basic communication themes, but its listening support was not fully usable in the school context. The textbook used in class was *Semangat Fasih*

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Berbahasa Arab 1 untuk MA Kelas X, published by Erlangga in 2023, and it covered six everyday communication themes, including *at-Taḥiyyah wa at-Ta'āruf*, *al-Usrah wa al-Bait*, *al-Madrasah wa Bī'atuhā*, *al-Ḥayāh al-Yawmiyyah*, *al-Hiwāyah*, and *aṭ-Ṭa'ām wa al-Asyriba* (Saefuloh, 2024). Although each chapter theoretically provided audio through barcode access, the audio required the publisher's smartphone application and could not be opened directly through a general scanner (Safitri & Santoso, 2023). Since students were not allowed to use smartphones during classroom learning, the barcode-based audio was not used in practice. Consequently, listening materials frequently depended on written texts, the teacher's voice, or generic YouTube videos that were not always aligned with the curriculum, students' proficiency level, or the intended communication setting (Said & Hikmah, 2024).

Across the four data sources, the findings point to a clear needs-to-design pathway. Limited learning frequency requires short and segmented videos. Heterogeneous prior proficiency levels require levelled listening materials that progress from vocabulary to simple sentences along with short discourse. Inaccessible textbook audio requires embedded audio that can be played directly through teacher-controlled devices or school computers. Limited contextual visualisation requires 3D animation that displays speakers, setting, objects, gestures, and communicative actions. Restricted smartphone use requires media scenarios that work in whole-class settings or computer laboratories. Limited interactive assessment requires Kahoot!-based formative evaluation that is directly connected to the video and audio content. Table 3 presents the translation from identified needs into media design decisions.

Table 3. Needs-to-Design Translation for AI-Enhanced Audiovisual Media

Identified need	Instructional risk	Suggested design decision
Limited learning frequency	Listening practice and repetition are insufficient.	Develop short, segmented videos focused on one istimā' objective per unit.
Heterogeneous prior proficiency	Some students may be left behind when directly exposed to long dialogues.	Sequence materials from vocabulary to simple sentences and short discourse.
Inaccessible textbook audio	Listening practice depends on the teacher's voice or generic online sources.	Provide embedded audio that can be played directly through teacher or school devices.
Limited contextual visualization	Students struggle to connect spoken input with meaning and situation.	Use 3D animation to show setting, speakers, objects, gestures, and communicative actions.
Restricted smartphone use	Individually accessed smartphone-based media may not be feasible.	Prepare whole-class, computer-laboratory, and teacher-managed access scenarios.
Limited interactive assessment	Teachers have difficulty checking listening comprehension quickly.	Integrate Kahoot! as formative assessment based on video and audio content.

The needs-based pathway connecting field constraints, learner needs, and media design decisions is illustrated in Figure 1.

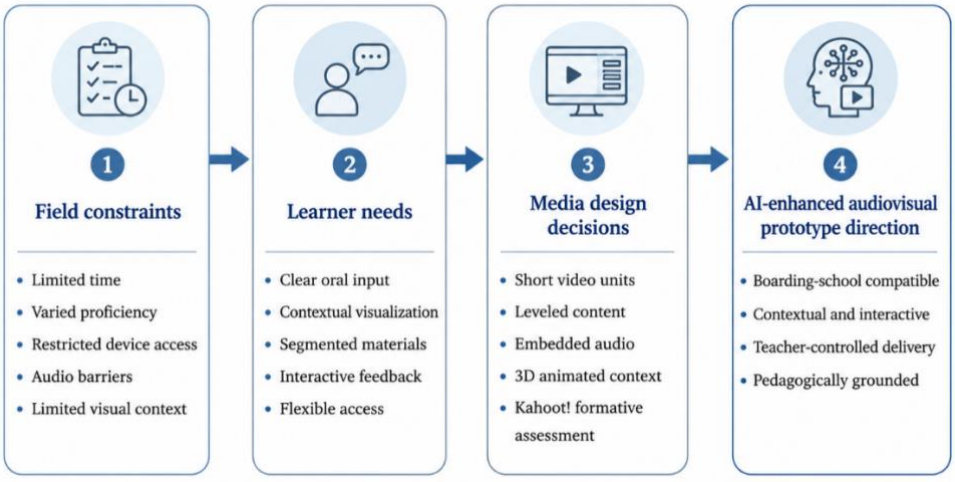


Figure 1. Needs-Based Design Pathway for AI-Enhanced Audiovisual Arabic Listening Media

The figure presents the logic derived from the needs analysis. Field constraints, for example limited time, varied proficiency, restricted device access, audio barriers, and limited visual context, generated specific learner requirements for clear oral input, contextual visualisation, segmented materials, interactive feedback, and flexible access. These requirements informed media design decisions, including the use of short video units, levelled content, embedded audio, 3D animated context, and Kahoot!-based formative assessment. The resulting design direction is an AI-enhanced audiovisual design framework that is compatible with the boarding school context, provides contextual and interactive experiences, is teacher-controlled in delivery, and is pedagogically grounded. This approach stresses that the proposed media should be developed based on instructional evidence.

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Collectively, the findings show that AI-enhanced audiovisual media for *mahārah al-istimā'* should be conceptualised as a needs-based design response. The function of AI should be restricted to supporting media production, such as generating visual concepts, audio, characters, or learning assets. Teachers and developers should retain responsibility for ensuring linguistic accuracy and making pedagogical decisions. The use of 3D animation should enhance the contextualisation of listening input by depicting relevant settings, characters, actions, and objects associated with spoken Arabic. Kahoot! should serve as an interactive formative assessment tool following listening activities, rather than replacing listening practice. The primary finding of this needs analysis is that media design for Arabic listening in boarding schools must integrate oral input, visual context, access conditions, and feedback tools before product development or effectiveness testing.

The findings indicate that Arabic listening instruction in boarding schools requires a needs-based approach to media design, rather than the simple adoption of digital tools. Strong student support for contextual visualisation suggests that effective listening instruction involves more than playing audio recordings. In mahārah al-istimā', students process sounds, vocabulary, sentence structures, and communicative situations simultaneously, making contextual support critical for comprehension. This result aligns with multimedia learning theory, which posits that learners benefit when verbal and visual information are integrated meaningfully, rather than presented separately or as mere embellishments (Mayer, 2024). It also corroborates research on audiovisual media in Arabic listening instruction, which finds that visual support helps learners connect spoken input with situational meaning (Hamidah & Marsiah, 2020). The present study advances these arguments by demonstrating that visualisation is not simply a motivational tool, but a necessary design response to students' challenges in linking Arabic sounds to contextual meaning.

This interpretation refines previous studies on animation and audiovisual learning. Prior research suggests that visual media support comprehension when visual elements are meaningfully connected to spoken input rather than used as decoration. In addition to visualisation, recent developments in AI-supported listening materials emphasise the importance of adjustable playback speed, vocabulary assistance, transcripts, and contextualised listening tasks. Therefore, the proposed framework should not only prioritise attractive visual features but also ensure that learners receive comprehensible oral input, linguistic support, and opportunities for repeated processing. These considerations explain why features such as segmented videos, embedded audio, contextual animation, and formative quizzes are recommended in this study.

The boarding school context challenges the assumption that digital media are inherently flexible, personal, and easily accessible. While several studies on digital and AI-supported learning highlight personalised access, adaptive pathways, and learner autonomy as key benefits of educational technology (Kem, 2022; Yuspita et al., 2023), this study demonstrates that digital flexibility is shaped by institutional policies. Although the school possessed basic infrastructure, including a teacher's computer, projector, speaker, Wi-Fi, and computer laboratory, students' use of personal smartphones was restricted during lessons. This limitation renders smartphone-dependent media impractical, even if technologically sophisticated. Therefore, AI-enhanced audiovisual media for boarding schools should emphasize teacher-controlled delivery, classroom projection, laboratory-based access, and embedded audio that does not require students to use personal devices. The findings further clarify the role of Kahoot! in Arabic listening instruction. Previous research has established that Kahoot! and gamified quizzes can enhance engagement, provide immediate feedback, and foster a more active learning environment in language classrooms (Kohnke & Moorhouse, 2022; Wang & Tahir, 2020). The present study confirms these benefits, as students expressed strong interest in Kahoot!-based interactive evaluation. However, this study contributes by specifying the appropriate use of Kahoot! in listening instruction. Kahoot! should not simply assess students' speed in reading questions or their competitiveness. Instead, a pedagogically sound design should use Kahoot! items to evaluate comprehension of heard vocabulary, explicit information in dialogues, the relationship between audio and visual context, and the overall meaning of the listening text. Thus, gamification should serve as formative assessment following listening activities, rather than replacing the listening process itself.

Students' positive responses toward AI require careful interpretation. While questionnaire results show openness to AI-supported media, they do not demonstrate a need or expectation for fully adaptive AI systems. This distinction is significant, as much of the discussion of AI in education equates AI with personalisation, automation, and adaptive instruction. In this study, AI is best positioned as a production-support tool that assists with generating visual concepts, producing audio, creating characters, drafting prompts, and expediting audiovisual development. Crucially, pedagogical decisions must remain under human control, specifically about Arabic language accuracy, cultural appropriateness, content suitability, and assessment validity. Maintaining a human-in-the-loop approach prevents the overstatement of AI's role as an autonomous instructional agent and ensures that media design remains aligned with language-learning objectives. This study adds to the literature by redirecting focus from product effectiveness to the rationale underlying pre-development design. Previous research has typically evaluated animated videos, audiovisual materials, or Kahoot! after their development and implementation (Barut Tugtekin & Dursun, 2022; Ni'mah et al., 2024; Rokhani et al., 2024). In contrast, this article addresses an earlier and essential phase: determining why specific media features are necessary and how the learning environment should inform their design. The findings show that learner challenges, institutional

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policies, available resources, textbook constraints, and instructional objectives should inform the design of AI-enhanced audiovisual media. This approach aids in preventing the creation of media that are visually attractive but lack pedagogical substance. Accordingly, needs analysis functions not only as a preliminary step but also as a quality-control mechanism for technology-enhanced Arabic listening instruction.

Overall, the discussion indicates that the development of AI-enhanced audiovisual media for mahārah al-istimā' should be driven by pedagogical necessity rather than technical innovation. Clear oral input remains central to Arabic listening instruction, with visualisation, AI-supported production, and Kahoot!-based assessment serving as supplementary elements. The data challenge the presumption that adopting the latest technology inherently improves learning, instead demonstrating that media effectiveness depends on contextual alignment. In boarding schools, this alignment itself encompasses compatibility with device policies, classroom audio conditions, variations in student proficiency, and teachers' requirements for manageable formative assessment. Consequently, the strongest design approach is not simply "AI-based media," but a needs-based, teacher-controlled, contextually visualised, and feedback-oriented audiovisual model for Arabic listening instruction.

3.1. Implications

The findings of this study confirm that the development of istimā' media must begin with an analysis of learners' needs, rather than with the selection of an app or digital device. Teachers and developers need to identify specific learning challenges, such as poor audio quality, limited access to recordings, a lack of visual context, differences in student abilities, and a lack of formative assessment. Based on these needs, AI-assisted audiovisual media should provide clear spoken input, contextual visuals, concise content, and feedback that supports comprehension. The quality of the media is not determined by the amount of technology used, but by its ability to help students understand spoken Arabic. In the learning process, such media can be used in a structured manner before, during, and after listening activities.

The design of the media must also be adapted to technical conditions and school regulations. In Islamic boarding schools or residential schools that restrict the use of smartphones, media requiring individual access is often difficult to implement. Therefore, the media must support use via classroom projectors, lab computers, teacher devices, and audio that can be played without individual devices. These data indicate that digital access does not always mean access through students' own devices. The flexibility of the media should be understood as its capacity to adapt to the policies, facilities, and learning patterns of educational institutions.

Every element in AI-assisted audiovisual media must serve a clear purpose. Audio should be the primary source for listening practice, as the goal of listening instruction is to develop students' ability to understand spoken Arabic. Animation serves as a contextual support so that students can associate sounds with characters, places, objects, movements, and communicative situations. AI can be utilised to assist in the production of images, characters, audio, and other media components, but linguistic accuracy and pedagogical appropriateness still require human monitoring. Kahoot! is more appropriately used as a formative assessment tool following listening activities, rather than as a substitute for listening practice.

Theoretically, this study reinforces the role of needs analysis as a bridge between multimedia learning theory, second-language listening instruction, and digital media design. Needs analysis functions as a quality control tool before media is developed, as it helps determine which features should be included, limited, or avoided. At the policy level, schools need to view technology integration as a pedagogical issue, not simply the provision of internet access, projectors, speakers, and computer labs. The implementation of media needs collaboration among teachers, curriculum administrators, and school leaders to ensure its use remains in accordance with institutional regulations. Future research would focus on expert validation, feasibility testing, student feedback, and measuring the impact of media on Arabic listening skills.

3.2. Limitations

Several limitations should be acknowledged when interpreting these findings. First, data collection was limited to a single boarding school, providing detailed insight into the institutional, instructional, and technological conditions of that specific site but restricting the generalisability of results to other educational settings. Boarding schools may vary in device-use policies, learning schedules, teacher autonomy, digital infrastructure, and students' prior Arabic proficiency. Consequently, the design implications presented here should be regarded as context-sensitive recommendations rather than universal guidelines for all Arabic listening classrooms. Second, the study addressed only the needs-analysis phase and did not include expert validation, prototype usability assessment, or post-implementation evaluation. Therefore, while the findings support the proposed direction for media design, they do not yet provide evidence that the AI-enhanced audiovisual media improves students' Arabic listening achievement.

Third, the questionnaire data were analysed using simple descriptive statistics, which were suitable for identifying students' perceived needs but insufficient for examining relationships among variables. The

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percentages reported should be interpreted as indicators of preference, readiness, and perceived relevance, rather than as predictive evidence of learning outcomes (Isaee, 2026). Fourth, students' positive responses to AI, 3D animation, and Kahoot! should not be interpreted as evidence that these technologies inherently enhance *mahārah al-istimā'*. These responses reflect perceived design needs, while the pedagogical effectiveness of these technologies requires further empirical investigation. Future research should expand this needs-based framework to include product development, expert validation, usability testing, learner-response analysis, and quasi-experimental evaluation to determine whether the resulting media can significantly improve Arabic listening comprehension across diverse educational contexts.

4. Conclusion

This study demonstrates that AI-enhanced audiovisual media for Arabic listening in boarding schools should begin with evidence-based needs analysis before product development. The findings identify key needs involving clear oral input, contextual visual support, segmented materials, accessible implementation, and formative assessment. The main contribution of this study is a needs-based design framework that connects field constraints, learner needs, and future media development decisions. However, the findings do not demonstrate that AI, 3D animation, or Kahoot! improve mahārah al-istimā'. Future research should proceed to prototype development, expert validation, usability testing, and effectiveness evaluation.

Author Contributions

All authors contributed equally to this paper. All authors have read and approved the final manuscript.

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Declaration of Conflicting Interests

The authors declare that they have no financial, personal, professional, or institutional conflicts of interest that could have influenced the design, conduct, analysis, interpretation, or reporting of this study. The manuscript was prepared from the first author's academic thesis and has been substantially reframed as an independent journal article focusing on needs analysis. The authors are responsible for ensuring that this manuscript does not duplicate any published work derived from the same thesis.

Ethics and Consent Declarations

This study was conducted in accordance with ethical principles for educational research involving school participants. Permission to conduct the study was obtained from the a private Islamic boarding school in Indonesia before data collection. The Arabic teacher and participating students were informed about the purpose of the study, the voluntary nature of their participation, the types of data collected, and the use of the data for academic publication. Participant confidentiality was protected by not reporting individual names, and all findings were presented in aggregated or anonymized form. Because the study involved tenth-grade students, consent procedures followed school and institutional regulations, including student assent and, where required, parental or guardian permission. Formal ethical approval was not required because the study was a low-risk educational needs analysis; however, school permission, informed consent procedures, confidentiality, and responsible data administration were observed throughout the research process.

Data Availability

The data supporting the findings of this study consist of classroom observation notes, interview summaries, questionnaire responses, and document-analysis records. The data are not publicly available because they contain school-based contextual information and participant-related details that may compromise confidentiality. Aggregated results are presented in the manuscript, and an anonymised subset of the data may be made available from the corresponding author upon reasonable request. Any data sharing will be subject to institutional permission, participant confidentiality, and applicable ethical requirements.

Declaration on AI Use

The authors declare that AI-assisted tools were used only to support language refinement, readability improvement, and editorial polishing of the manuscript under full human supervision. The research design, data collection, data analysis, interpretation of findings, scientific arguments, conclusions, and recommendations were developed and verified by the authors. AI tools were not used to generate original scientific data, replace authorial judgment, conduct analysis independently, or produce conclusions. No AI tool is credited as an author, and the authors take full responsibility for the accuracy, integrity, and originality of the manuscript.

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