

Needs Analysis for the Development of Artificial Intelligence (AI) - Generated Podcast Module in Arabic Listening Skill Acquisition among Non-Native Learners

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ABSTRACT

Listening is a fundamental language skill that supports communication and contributes to the development of speaking, vocabulary, pronunciation, and overall language proficiency. However, Arabic language learners often face challenges due to limited exposure to authentic input and inadequate opportunities for flexible listening practice. Artificial Intelligence (AI)-generated podcasts have the potential to address these challenges by providing authentic, adaptive, and accessible audio learning resources. This study aims to identify learners' needs for the development of an AI-generated podcast module to support listening skill acquisition. Guided by the Analysis phase of the ADDIE model, a quantitative survey was conducted among 15 undergraduate students from the Bachelor of Arabic Studies programme at Universiti Sultan Zainal Abidin (UniSZA). Data were collected using a structured questionnaire distributed via Google Forms and analyzed using descriptive statistics in SPSS Version 23. The instrument demonstrated excellent reliability, with a Cronbach's alpha value exceeding 0.90. The findings indicate positive attitudes towards podcast-based learning, challenges in current listening instruction, high readiness for technology-enhanced learning, and a strong perceived need for AI-generated podcasts. Participants also identified preferred podcast genres and content characteristics that could enhance listening engagement and comprehension. The study highlights the need for innovative AI-supported learning resources and provides empirical evidence to guide the development of an AI-generated podcast module for Arabic listening instruction.

Keywords: Listening Skill; Artificial Intelligence; AI-Generated Podcast; Needs Analysis.

INTRODUCTION

Listening is a fundamental language skill that serves as the foundation for effective communication and supports the development of speaking, vocabulary, pronunciation, and overall language proficiency¹. Through meaningful listening activities, learners are exposed to authentic linguistic input that facilitates language acquisition and comprehension². However, despite its importance, listening remains one of the most difficult skills for language learners due to factors such as unfamiliar vocabulary, rapid speech, diverse accents, and limited opportunities for repeated exposure and guided practice^{3,4}. These challenges highlight the need for innovative instructional approaches that provide authentic, flexible, and learner-centred listening experiences.

Despite ongoing advances in educational technology, listening instruction in many language classrooms continues to rely on conventional resources, including scripted recordings, textbook-based exercises, and teacher-led activities⁵. Although these methods remain pedagogically valuable, they often lack personalization, flexibility, and opportunities for sustained learner engagement. Contemporary learners increasingly expect interactive and technology-enhanced learning environments that support self-paced and individualized learning. As a result, educators and researchers are exploring innovative technologies that can enhance listening to instruction and better address diverse learner needs.

In foreign language education, artificial intelligence (AI) has emerged as a significant tool for supporting the development of language skills, including listening, speaking, reading, and writing. Language learning is widely recognized as essential for communication, cultural understanding, and personal development in a globalized

world (Alqarni & Alhramelah, 2025). Consequently, educators and learners continue to seek innovative pedagogical tools and methodologies to enhance language learning and address diverse learner needs (Alqarni & Alhramelah, 2025).

Recent advancements in generative (AI) have created new opportunities for producing scalable, customizable, and adaptive educational content. AI-powered systems can generate natural-sounding speech, adjust content according to proficiency levels, and support personalized learning. Studies conducted between 2022 and 2025 indicate that generative AI has significant potential to enhance language learning by improving learner engagement, promoting autonomy, and enabling the development of contextually relevant materials. Tools such as chatbots, speech recognition systems, and automated feedback systems further provide learners with interactive and authentic language practice opportunities⁸, contributing to improved learning outcomes and motivation⁹. However, much of the existing research focuses on general language performance rather than skill-specific applications, particularly in listening.

In the era of digital learning, podcasts are rapidly becoming essential tools for higher education across various disciplines, including language, medicine, and marketing⁴. AI-generated podcasts, in particular, offer promising potential for listening instruction by providing flexible, repeatable, and accessible audio-based learning experiences. When supported by AI, podcast content can be efficiently generated, tailored to specific learning objectives, and adapted to different proficiency levels. This enables educators to deliver personalized listening materials while reducing time and resource constraints. Moreover, AI-generated podcasts align with learner-centred principles by promoting independent learning, repeated exposure, and flexible access beyond the classroom.

The successful development of an AI-generated podcast module requires a thorough understanding of learners' needs. A needs analysis is therefore essential to identify learners' challenges, expectations, technological readiness, and instructional preferences. Such analysis provides a strong empirical foundation for designing pedagogically relevant and user-centred instructional materials aligned with contemporary language learning practices. Although existing studies highlight the benefits of AI in enhancing learner engagement and language performance, most focus on post-implementation outcomes rather than pre-development needs. As a result, there is limited guidance on how AI-supported learning tools should be designed based on learner requirements. This gap is addressed in the present study through a systematic needs analysis.

A comprehensive understanding of these factors is crucial for improving the relevance, usability, and effectiveness of AI-supported learning resources. Needs analysis, as a key phase in instructional design, enables developers to identify learners' challenges, preferences, and pedagogical needs prior to intervention development. However, empirical evidence specifically related to the design requirements of AI-generated podcast modules for listening instruction remains limited. Therefore, this study aims to conduct a needs analysis for the development of an AI-generated podcast module to support Arabic listening skill acquisition. By identifying learners' instructional and technological needs, the study seeks to establish an empirical foundation for designing a learner-centred, pedagogically grounded, and technologically relevant module that contributes to the advancement of AI-enhanced language education.

The proposed module will use AI to create structured and adaptive audio content delivered through a podcast platform. It will include listening materials designed for higher education learners, with content that suits different proficiency levels and learning needs. The podcasts will be presented in an engaging audio format and supported by learning activities such as comprehension questions, guided listening tasks, and reflection exercises. This AI-generated podcast module is expected to allow learners to practice listening more flexibly and independently, both inside and outside the classroom. It will provide repeated exposure to listening input in a more structured, accessible, and meaningful way, helping to improve overall listening comprehension.

METHODOLOGY

This study adopted the ADDIE instructional design model, which comprises five phases: Analysis, Design, Development, Implementation, and Evaluation. The present study focused on the Analysis phase, specifically the needs analysis conducted to establish an empirical basis for the subsequent design and development of an

Artificial Intelligence-generated podcast (AIGP) module for Arabic listening skill acquisition. Needs analysis is essential for identifying learners' difficulties, needs, and contextual requirements before instructional design (Abdul Hamid et al., 2024; Salleh, 2022).

A quantitative survey was conducted using a structured questionnaire developed from empirical studies on Arabic listening (Shafeeqah,2024; Almira, 2024), podcast-based language learning, and artificial intelligence in language education (Kokala,2024). Relevant items were adapted to the context of non-native Arabic learners, while additional items were developed to capture specific AIGP design requirements. The questionnaire comprised five sections: demographic information and four domains covering listening experiences, listening difficulties, attitudes towards technology and AI-supported learning, and the perceived need for an AIGP module and its preferred design features. The items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

An expert review was conducted to examine the relevance, clarity, and appropriateness of the instrument. Two experts with expertise in Arabic language and educational technology from Universiti Sains Islam Malaysia (USIM) and Universiti Sultan Zainal Abidin (UniSZA), respectively, reviewed the questionnaire. The revisions primarily involved correcting typographical errors, improving grammatical accuracy and language use, and refining the wording of selected items to enhance clarity and readability. The questionnaire was subsequently revised based on their recommendations

The finalized questionnaire was distributed through Google Forms to 15 undergraduate students in Arabic Studies at Universiti Sultan Zainal Abidin (UniSZA) using purposive sampling for pilot testing. The respondents represented the target population of non-native Arabic learners. Participation was voluntary and based on informed consent and solely for academic purposes.

The data were analysed using IBM SPSS Statistics version 23. Descriptive statistics, including means, and standard deviations, were used to analyze learners' needs, difficulties, preferences, and perceived AIGP requirements. The internal consistency of the multi-item questionnaire domains was also examined using Cronbach's alpha. . Mean scores were interpreted based on the guideline proposed by Nunnally and Bernstein (1994). The findings were used to identify learners' priority needs and establish design requirements for the subsequent Design and Development phases of the ADDIE model.

RESULTS AND DISCUSSION

Learners' Difficulties in Listening Skill Comprehension

Table 1 shows the mean score and standard deviation of the respondents' feedback on the learners' difficulties in listening skill comprehension.

Table 1 Learners' Difficulties in Listening Skill Comprehension

	Difficulties in listening skill	Mean	SD	Interpretation (level of difficulty)
B1	Difficulty recognizing MSA vs colloquial sounds	3.36	1.08	Moderate
B2	Difficulty distinguishing similar letters (sin/sad)	2.93	1.07	Moderate
B3	Difficulty understanding new vocabulary	3.79	0.89	High
B4	Difficulty understanding complex grammatical structures	3.93	0.92	High
B5	Difficulty understanding long sentences	3.64	0.93	Moderate
B6	Difficulty adapting to speech speed	4.36	0.84	Very high
B7	Difficulty understanding sentence meaning from context	3.71	0.99	High
B8	Lack of Arabic language environment for listening	4	1.11	Very high
B9	Limited teaching time for listening skill development	3.93	1.07	High
B10	Insufficient training for developing Arabic listening skills	4.21	0.7	Very high
B11	Digital recordings sound unnatural in pronunciation	3.5	0.94	Moderate
B12	Do not self-assess comprehension after listening	3.71	0.91	High

Table 1 shows that the analysis of the data for the aspect of learners' difficulties in listening skill comprehension by the students is at high level. Based on the analysis of this data, it is known that top three difficulties faced by learners in listening skill recorded the highest mean score is B6 difficulty adapting to speech speed, following B10 insufficient training for developing Arabic listening skill, and B8 lack of Arabic language environment for listening.

Table 1 shows that the overall level of difficulties in Arabic listening skills among students is generally high. Among the identified challenges, difficulty adapting to speech speed recorded the highest mean score ($M = 4.36$, $SD = 0.84$), indicating that this is the most significant obstacle faced by students. This was followed by insufficient training for developing Arabic listening skills ($M = 4.21$, $SD = 0.70$) and lack of an Arabic language environment for listening practice ($M = 4.00$, $SD = 1.11$).

Other difficulties that also recorded relatively high mean scores include understanding complex grammatical structures ($M = 3.93$, $SD = 0.92$), limited teaching time for listening skill development ($M = 3.93$, $SD = 1.07$), understanding new vocabulary ($M = 3.79$, $SD = 0.89$), understanding sentence meaning from context ($M = 3.71$, $SD = 0.99$), not conducting self-assessment after listening ($M = 3.71$, $SD = 0.91$), understanding long sentences ($M = 3.64$, $SD = 0.93$), and digital recordings sounding unnatural in pronunciation ($M = 3.50$, $SD = 0.94$). Students also reported difficulty recognizing the differences between Modern Standard Arabic (MSA) and colloquial sounds ($M = 3.36$, $SD = 1.08$).

The item with the lowest mean score was difficulty distinguishing similar Arabic letters (e.g., *sīn* and *ṣād*) ($M = 2.93$, $SD = 1.07$), suggesting that this issue was comparatively less challenging than the other aspects measured. Overall, the findings indicate that students experience notable challenges in Arabic listening comprehension, particularly those related to speech rate, opportunities for listening practice, and targeted listening skills training.

Learners' Acceptance of AI-Generated Podcasts (AIGP)

Table 2 Learners' Acceptance Of AI-Generated Podcast (AIGP)

	Learners' Acceptance of AI-Generated Podcasts	Mean	SD	Interpretation
P1	Awareness of podcasts			High
P2	Frequency of listening to Arabic podcast			Moderate
P3	Prefer learning through audio/podcast materials	3.93	0.73	High
P4	Podcast makes learning more enjoyable	3.93	0.92	High
P5	Prefer content by language level (beginner/intermediate/advanced)	4.36	0.74	Very high
P6	Need short episodes (1-2 minutes)	4	0.78	High
P7	Need content in Modern Standard Arabic (Fusha)	4.5	0.65	Very high
P8	Prefer interactive questions after each episode	4.36	0.74	Very high
P9	Prefer learning with AI-powered podcast	3.93	0.92	High

Table 2 presents the learners' acceptance of AI-generated podcasts in supporting Arabic language learning. However, two initial screening items (P1 and P2) regarding awareness of podcasts and frequency of listening to Arabic podcasts were not reported in the table as it is not measured in Likert Scale, the majority of respondents (92.9%) reported that they were aware of Arabic podcasts, while only one respondent (7.1%) indicated that they were not aware of them. This suggests that awareness of Arabic podcasts among the participants is very high. Most respondents (64.3%) reported that they sometimes listened to Arabic podcasts, followed by 21.4% who listened often. Only 14.3% indicated that they never listened to Arabic podcasts, and none reported listening always. These findings suggest that although awareness of Arabic podcasts is high, regular use remains moderate.

Overall, the findings indicate a positive level of acceptance, particularly in relation to content design and learning preferences that support accessibility and engagement. Among all items, the highest mean score was recorded for the preference for content in Modern Standard Arabic (Fusha) ($M = 4.50$, $SD = 0.65$), indicating that learners strongly value standardized Arabic input in podcast-based learning. This was followed by preference for content

structured according to language proficiency level (beginner/intermediate/advanced) ($M = 4.36$, $SD = 0.74$) and preference for interactive questions after each episode ($M = 4.36$, $SD = 0.74$), suggesting that learners favor scaffolded and interactive learning experiences. Items such as needing short podcast episodes (1–2 minutes) recorded a high mean score ($M = 4.00$, $SD = 0.78$), showing that learners prefer concise and focused audio content.

In addition, learners also reported positive acceptance of AI-generated podcast learning, with preference for audio/podcast-based learning materials ($M = 3.93$, $SD = 0.73$), perception that podcasts make learning more enjoyable ($M = 3.93$, $SD = 0.92$), and preference for AI-powered podcast learning ($M = 3.93$, $SD = 0.92$), all indicating a generally positive attitude towards this learning approach. Overall, the results demonstrate that learners show positive acceptance of AI-generated podcasts, particularly when content is structured, level-based, interactive, and delivered in Modern Standard Arabic.

Podcast Topic

Table 3 Podcast Topic

	Podcast Topic	Mean	SD	Interpretation
T1	Topic: Daily Life	4.57	0.51	Very high
T2	Topic: University Life	4.5	0.65	Very high
T3	Topic: Prophetic Stories	4.29	0.83	High
T4	Topic: Travel	4.07	0.83	High
T5	Topic: Food	4.36	0.74	High
T6	Topic: Honoring Parents	4.36	0.63	High
T7	Topic: Respecting Guests	4	0.88	High
T8	Topic: Short Stories	4.36	0.93	High
T9	Topic: Family	4.29	0.73	High
T10	Topic: Current Issues	4	0.88	High

Table 3 presents the preferred topics for AI-generated podcast content among learners. The findings indicate a strong preference for podcast topics that are closely related to learners' daily experiences, Islamic values, and real-life communication contexts. Among all items, the highest preference was recorded for Daily Life (T1), suggesting that learners show strong interest in daily routine content. This was followed by University Life (T2) which reflect their preference for content that is relatable and applicable to their immediate environment.

Topics such as Family (T9) and Short Stories and (T8) also indicate a preference for storytelling and family-oriented themes that support emotional and cultural engagement in learning that are highly favoured among respondents. Furthermore, learners expressed interest in broader communicative and contemporary content such as Travel (T4) and Current Issues (T10), suggesting that they are also open to learning materials that extend beyond personal and social contexts into real-world and global topics.

Overall, the results demonstrate that learners prefer AI-generated podcast content that is value-based, relatable, and contextually meaningful, daily communication, and storytelling elements. These findings suggest that such topics may be useful for informing the content design of the proposed podcast module.

Design Requirements for an AI-Generated Podcast Module

Table 4 Design Requirements for an AI-Generated Podcast Module

	Design Requirements for an AI-Generated Podcast Module	Mean	SD	Interpretation
A1	Need to control audio playback speed	3.79	0.89	High
A2	Need synchronized text display with audio	4.21	0.58	Very high
A3	Need instant translation and vocabulary explanation	3.93	1	High

A4	Need immediate feedback after answering questions	3.93	0.92	High
A5	Need interactive questions after listening	4	0.78	High
A6	Need to listen to Fusha dialogue format	4.25	0.62	Very high

Table 4 presents the learners' needs for the development of an AIGP for Arabic listening skills. The findings indicate that learners require a high level of interactive, supportive, and adaptive features to enhance their listening comprehension. Among all identified needs, the highest-rated design requirement was the provision of Fusha dialogue formats (A6) indicates a preference for structured Modern Standard Arabic input, which aligns with formal language learning objectives. In addition, learners expressed a strong need for synchronized text display with audio (A2), which reflects learners' preference for multimodal input to improve comprehension during listening tasks.

Furthermore, Furthermore, the need for interactive questions after listening (A5) and immediate feedback after answering questions (A4) suggests that learners value active learning and formative assessment features in listening activities. These findings indicate that learners prefer an interactive learning environment rather than passive audio consumption. Furthermore, the need to control audio playback speed (A1) highlights learners' requirement for flexibility in managing input difficulty, particularly when dealing with fast spoken Arabic.

Table 5 Reliability Analysis Cronbach Alpha

Section / Scale	Items	n Used	Cronbach's α	Interpretation
Part II: Listening Difficulties	12	15	0.8772	Good
Part III: Podcast Preferences	7	15	0.8220	Good
Part IV: Topics	10	15	0.8819	Good
Part V: AI Podcast Features	6	15	0.8270	Good
Overall (All 35 items)	35	15	0.926	Excellent

Reliability Analysis

The internal consistency of the questionnaire was examined using Cronbach's alpha. The four substantive sections produced alpha values ranging from 0.822 to 0.882, while the overall 35-item instrument yielded an alpha of 0.926, indicating high internal consistency for the exploratory needs analysis. Overall, the reliability results indicated that the questionnaire demonstrated acceptable internal consistency and provided a structured basis for identifying learners' listening difficulties, preferences, content interests, and requirements for the development of the AIGP module.

DISCUSSION

Overall, the needs analysis findings revealed learners' positive attitudes toward podcast-based learning, significant challenges in current listening instruction, high readiness for technology-enhanced learning, and a strong perceived need for AI-generated podcasts. Participants also identified preferred content characteristics and design features that could enhance engagement and listening comprehension. the findings provide empirical evidence supporting the development of an AI-generated podcast module for Arabic listening instruction. Guided by the ADDIE model, the needs analysis ensures that the proposed instructional design is aligned with learners' actual needs, thereby strengthening the pedagogical and technological relevance of the intervention.

From a critical pedagogical standpoint, these findings suggest a perceived need for greater flexibility, accessibility, and learner support in Arabic listening practice. The reliance on conventional audio materials appears insufficient to address the cognitive and contextual demands of L2 listening development. In this sense, the data reflect a misalignment between instructional design practices and contemporary learner expectations shaped by digital learning environments. The strong preference for adaptive and interactive podcast features further suggests that learners value learning environments that actively scaffold comprehension, provide immediate support, and allow opportunities for self-regulated learning.

Although previous studies consistently demonstrate that AI enhances learner engagement and language performance¹⁰⁻¹⁵, most existing studies have concentrated on evaluating AI-based tools after their implementation, with limited attention given to the identification of learner needs prior to development. This represents an important gap in the literature, needs analysis is important for informing the development of effective educational technologies and instructional materials. The present study addresses this gap by providing systematic evidence from a needs analysis that informs the design of an AI-generated podcast module for Arabic listening instruction. This study contributes as a foundation for instructional design, thereby shifting the discourse from technology effectiveness to design necessity and contextual relevance.

CONCLUSION

In conclusion, the findings from the needs analysis phase indicate a need for Arabic listening skill development, with a strong need for the integration of Generative AI, specifically an AI-generated podcast module, to support listening skill acquisition. The results show that students face difficulties in current listening instruction, have positive attitudes toward technology, and demonstrate strong readiness for AI-supported learning. The proposed module will use AI to generate structured and adaptive audio content delivered through a podcast platform, with materials designed for higher education learners at different proficiency levels. It will incorporate engaging listening input supported by activities such as comprehension questions, guided listening tasks, and reflective exercises. Overall, the proposed module is therefore intended to provide learners with flexible, independent, and repeated access to listening practice beyond the classroom.

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