

FROM NEEDS TO DESIGN: STUDENTS' READINESS FOR AUGMENTED REALITY IN CEFR A1 ARABIC LEARNING

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Abstract. Listening skills are fundamental in language acquisition. Based on previous research findings, several challenges have been identified in mastering listening skills, thus highlighting the need for innovative approaches. Therefore, this study aims to examine students' readiness and design requirements for the integration of augmented reality (AR) in learning Arabic listening skills at the CEFR A1 level. This study employed a quantitative research design using a questionnaire distributed to 261 students from the Social Sciences cluster at Universiti Teknologi MARA (UiTM) Shah Alam, who were taking Arabic as a third language. Purposive sampling was used to select the respondents. The data were analysed using SPSS version 29 to obtain mean scores, standard deviations, and percentages. The findings indicate that students demonstrate a high level of readiness towards the use of AR, particularly in terms of interest in multimedia integration and willingness to engage in interactive learning environments. In addition, the study identified key design requirements, including multimodal content integration, user-friendly interface design, and alignment with CEFR A1 proficiency level. The study concludes that the successful integration of AR in Arabic listening learning is not solely dependent on technological availability but is also influenced by students' readiness and pedagogically grounded design. These findings contribute to the development of needs-driven AR-based learning applications in foreign language education.

Keywords: *listening skills, Arabic language, students' readiness, design, augmented reality*

Introduction

Listening skills constitute a fundamental component in language acquisition, particularly at the beginner level, where learners rely heavily on auditory input to construct meaning. Listening is often perceived as challenging due to unfamiliar phonological structures and limited exposure to authentic language input, especially in the context of learning Arabic as a foreign language. Previous studies have identified several challenges in teaching Arabic listening skills, including the lack of structured audio materials and the overreliance on textbook-based approaches (Shaharuddin et al., 2025). In many cases, listening activities are confined to lecturers reading texts or dialogues from textbooks, which inadvertently limits learners' exposure to variations in pronunciation, intonation, and authentic language use. This situation may hinder the development of learners' auditory processing skills, particularly at the beginner level. According to the Common European Framework of Reference for Languages (CEFR), learners at the A1 level are expected to understand familiar words and basic expressions commonly used in everyday situations when delivered clearly and slowly (Council of Europe, 2020). Therefore, listening instruction at this level requires structured, gradual input supported by clear contextual elements. However, findings from previous studies

indicate that existing instructional practices often fail to meet these requirements, thereby creating a gap between learners' needs and current teaching practices.

In line with advancements in educational technology, the use of augmented reality (AR) has the potential to enhance language learning through interactive and multimodal environments. AR integrates visual and auditory elements within an interactive learning setting, enabling learners to process language input more effectively (Garzón and Acevedo, 2023). Furthermore, multimedia-based learning approaches have been shown to increase learner motivation and engagement by providing more meaningful and contextualized learning experiences (Mayer, 2021). Nevertheless, most prior studies have predominantly focused on the effectiveness of technologies such as AR in improving learning outcomes, with insufficient emphasis on learners' needs analysis as a foundational basis for application development. In instructional design, needs analysis is a critical step to ensure that any developed intervention aligns with learners' abilities and learning requirements. Therefore, this study was conducted to examine learners' readiness and to identify design requirements for the development of an AR application to support Arabic listening skills at the CEFR A1 level. This study shifts the focus from merely identifying learning challenges to understanding learners' readiness and how these findings can inform the development of a more effective, needs-based application design.

Literature review

In the Malaysian context, the learning of Arabic as a foreign language has been increasingly developed, particularly in higher education institutions. Nevertheless, several local studies indicate that students continue to face difficulties in mastering basic language skills, including listening, which is often underemphasized in instructional practices (Rahman and Mamat, 2022). A study by Yusoff and Abdullah (2023) found that the teaching of Arabic listening skills tends to rely heavily on traditional approaches, primarily textbook-based instruction, with limited availability of supporting audio and multimedia materials. This situation restricts students' exposure to authentic and varied language input, thereby affecting their understanding of pronunciation and linguistic structures. In addition, other studies have shown that students demonstrate a high level of interest in the use of technology in language learning, particularly interactive and engaging multimedia-based materials (Hashim and Yunus, 2022). This suggests that integrating Arabic listening instruction with augmented reality (AR) technology holds significant potential to enhance students' learning experiences. However, Omar et al. (2024) emphasizes that the use of technology in Arabic language learning has yet to be fully optimized, particularly in terms of instructional design that is grounded in learners' needs. Most existing applications tend to focus on visual appeal and interactivity without sufficiently considering learners' proficiency levels and readiness. Therefore, there is a need for studies that specifically examine learners' needs and readiness as a foundation for developing more effective and needs-based Arabic language learning applications.

In language learning, learners' proficiency levels are structured based on the CEFR framework, which provides clear guidelines for language competence. At the A1 level, learners are expected to understand familiar words and basic expressions when delivered clearly and slowly (Council of Europe, 2020). García and Pérez (2022) highlight that beginner learners require structured input focusing on basic vocabulary. Furthermore, repetition and exposure to auditory input play a crucial role in enhancing

comprehension (Hamada, 2023). However, Sweller et al. (2023) found that learning materials are often not aligned with the CEFR A1 level, resulting in increased cognitive load among learners. Therefore, learning materials should be supported by multimodal elements to facilitate comprehension, particularly in Arabic listening skills. Multimedia Learning Theory posits that learning becomes more effective when information is presented through a combination of visual and verbal elements (Mayer, 2021). Chen et al. (2023) demonstrated that the integration of visual elements in listening instruction helps learners interpret meaning through contextual cues. In addition, the use of multimedia has been found to enhance learners' motivation (Rahman and Hashim, 2024). Nevertheless, poorly designed multimedia may increase cognitive load and negatively affect learning outcomes (Nurjanah and Retnowati, 2024). Therefore, multimedia integration must be guided by clear pedagogical principles.

Augmented reality (AR) technology has been increasingly utilized in language learning contexts. AR enables the integration of digital elements into real-world environments in an interactive manner. Meta-analytical studies have shown that AR has a positive impact on learners' achievement and motivation (Garzón and Acevedo, 2023). Additionally, Radianti et al. (2020) found that AR supports experiential learning through the integration of visual and auditory elements. In the context of listening skills, AR can assist learners in understanding input through visual support (Zhu et al., 2026). However, the effectiveness of AR depends heavily on instructional design that aligns with learners' needs (Parong and Mayer, 2023; Makransky and Petersen, 2022). Needs analysis is a critical step in ensuring that learning materials are aligned with learners' actual needs. A needs-driven design approach emphasizes that educational technology development should be grounded in learners' real requirements (Brown, 2023). However, Baharudin and Mohamad (2025) indicate that many educational applications are developed without in-depth needs analysis, resulting in a mismatch between the technology and learning needs. Based on the literature review, most studies have focused on the effectiveness of technology without adequately examining learners' needs and readiness as a foundation for development. Therefore, this study aims to address this gap by investigating learners' readiness and identifying design implications for the development of an AR application to support Arabic listening skills.

Materials and Methods

This study employed a quantitative survey research design to examine students' readiness to use augmented reality (AR) technology in learning listening skills, as well as to identify the key design requirements for developing an AR application for Arabic listening instruction. A quantitative approach was selected as it enables the collection of numerical data that can be statistically analyzed to provide a comprehensive understanding of learners' readiness and design needs in the development of AR applications (Creswell and Creswell, 2018). The sample selection was conducted using purposive sampling, focusing on students who were enrolled in Arabic as a third language within the Social Sciences cluster. A total of 261 students from Universiti Teknologi MARA (UiTM), Shah Alam, Selangor, were selected as respondents. The sample size was determined based on the Krejcie and Morgan (1970) table, which recommends a minimum of 260 respondents for populations exceeding 800 individuals. Therefore, the sample size in this study ($n = 261$) is considered sufficient and representative of the study population.

The primary instrument used in this study was a structured questionnaire developed to measure students' readiness to use AR technology in learning Arabic listening skills, as well as to examine the key design requirements for integrating AR into listening instruction. Prior to the actual data collection, a pilot study was conducted to assess the reliability of the instrument. The results of the pilot analysis indicated a Cronbach's alpha coefficient of 0.908, demonstrating a high level of reliability (Pallant, 2020). This value indicates that the questionnaire items are internally consistent and suitable for use in the actual data collection. The questionnaire was distributed to the target respondents to obtain information related to demographic background, students' readiness, and the key design requirements to be integrated into Arabic listening instruction. Participation in this study was voluntary, and all responses were collected anonymously to ensure accuracy and honesty in the responses provided. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 29. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to describe the demographic profile of the respondents as well as their level of difficulty in Arabic listening skills. The interpretation of mean scores in this study was based on four classification levels: low, moderately low, moderately high, and high. *Table 1* presents the range of mean scores and their interpretations.

Table 1. *Interpretation of mean score values.*

Mean score range	Interpretation
1.00 – 2.00	Low
2.01 – 3.00	Moderately Low
3.01 – 4.00	Moderately High
4.01 – 5.00	High

Results and Discussion

Demographic analysis

A total of 261 students from the Social Sciences cluster at Universiti Teknologi MARA (UiTM), Shah Alam, participated in this study. The majority of respondents were aged between 18 and 22 years and were enrolled in Arabic as a third language. In terms of learning experience, most respondents possessed a basic background in Arabic. From a technological perspective, the majority of students used smartphones and had access to the internet, which supports the implementation of technology-enhanced learning approaches such as augmented reality.

Analysis of students' acceptance of multimedia, with emphasis on augmented reality, in Arabic listening skills learning

The findings for the construct of students' acceptance of multimedia use, particularly augmented reality (AR), in learning Arabic listening skills indicate that all items were rated at a high level, with an overall mean score of 4.33 and a standard deviation of 0.637. This high overall mean suggests that students not only accept the use of technology but are also willing to integrate it into their learning processes. The high level of acceptance may be attributed to the tendency of contemporary learners, who are increasingly exposed to digital technology and multimedia-based learning environments. This finding is consistent with Mayer (2021), who asserts that learning becomes more effective when information is delivered through a combination of visual

and auditory elements. In the context of this study, students' readiness to use multimedia reflects an existing foundation of acceptance toward multimodal learning approaches (Table 2). Specifically, item D5, which states that learning Arabic listening skills through augmented reality is more interactive, recorded the highest mean score of 4.43 (SD = 0.668). This finding indicates that the majority of students perceive AR as capable of enhancing interactivity in the learning process. The prominence of item D5 also highlights interactivity as a critical factor in promoting student engagement. This is supported by Garzón and Acevedo (2023), who found that AR enhances student motivation and engagement through immersive learning experiences. In addition, items D1 and D2 each recorded a mean score of 4.40, indicating that students have a high level of interest in using multimedia and are willing to engage with multimedia-based learning materials in Arabic listening instruction. From a technological accessibility perspective, items D3 and D4 also demonstrated high mean scores of 4.32 and 4.14, respectively, suggesting that students generally do not encounter significant issues related to device availability or internet access when engaging in AR-based learning activities.

Table 2. Analysis of students' acceptance of multimedia, with emphasis on augmented reality in Arabic listening skills learning.

No.	Item	SD	D	LA	A	SA	Mean	SD	Interpretation
D1	I am interested in using multimedia in learning Arabic listening skills.	0 0%	3 1.1%	23 8.8%	101 38.75	134 51.3%	4.40	0.698	High
D2	I am willing to use Arabic multimedia materials in learning Arabic listening skills.	0 0%	2 0.8%	26 10.0%	99 37.9%	134 51.3%	4.40	0.698	High
D3	I do not have any device-related issues in using augmented reality as an activity in learning Arabic listening skills.	1 0.4%	2 0.8%	39 14.9%	90 34.5%	129 49.4%	4.32	0.781	High
D4	I do not have any internet access issues in using augmented reality as an activity in learning Arabic listening skills.	1 0.4%	9 3.4%	49 18.8%	95 36.4%	107 41.0%	4.14	0.868	High
D5	I believe that learning Arabic listening skills assisted by augmented reality is more interactive.	0 0%	0 0%	26 10.0%	96 36.8%	139 53.3%	4.43	0.668	High
Total Mean							4.33	0.637	High

From a technical standpoint, these findings indicate that students do not face substantial barriers in terms of devices and internet access. This suggests that technological infrastructure is no longer a primary obstacle to the implementation of AR-based learning. However, these findings should be interpreted with caution, as technological readiness alone does not guarantee effective learning outcomes if the application design is not aligned with pedagogical needs. Overall, the findings suggest that students can be characterized as "ready but dependent on design," meaning that while they are prepared to adopt technology, the effectiveness of learning remains contingent upon how the technology is designed and implemented within the educational context. Therefore, this study demonstrates that students exhibit a high level of acceptance toward the use of multimedia and augmented reality in learning Arabic listening skills.

Analysis of proposed design and development requirements for an augmented reality application in Arabic listening skills learning

For the construct of proposed design and development of the augmented reality (AR) application, the findings indicate that all items were rated at a high level, with an overall mean score of 4.50 and a standard deviation of 0.557. This suggests that students have high expectations regarding the design and development of the AR application. The item that recorded the highest mean score was E3, which refers to the need for visual or image elements in the application, with a mean of 4.53 (SD = 0.598). This indicates that students place strong emphasis on the importance of visual elements in supporting the learning of Arabic listening skills. In addition, several other items also recorded high mean scores of 4.52, including the need for a user-friendly application (E1), the inclusion of audio elements (E2), and the accessibility of the application anytime and anywhere (E9 and E10). These findings suggest that usability and flexibility are among the key elements in application development. Items related to video elements (E4), text (E5), and listening exercises (E7) also recorded high mean scores of approximately 4.51. This indicates that students expect the application to integrate multiple multimedia elements to support the learning of Arabic listening skills. Furthermore, item E8 demonstrates that students emphasize the importance of developing the application based on their proficiency level, while items E11 and E12 highlight the importance of interaction in the teaching and learning process, as well as the use of the application as a learning activity. The need for multimedia elements such as audio, visual, video, and text indicates that students require a multimodal learning approach. This finding is consistent with Multimedia Learning Theory, which posits that the integration of multiple channels of information enhances understanding and reduces learners' cognitive load (Mayer, 2021) (Table 3).

Table 3. Analysis of proposed design and development requirements for an augmented reality application in Arabic listening skills learning.

No.	Item	SD	D	LA	A	SA	Mean	SD	Interpretation
E1	The augmented reality application should be easy to use.	0 0%	1 0.4%	13 5.0%	97 37.2%	150 57.5%	4.52	0.611	High
E2	The augmented reality application should include audio elements in the development of Arabic listening learning materials.	0 0%	0 0%	16 6.1%	93 35.6%	152 58.2%	4.52	0.611	High
E3	The augmented reality application should include visual elements (images) in the development of Arabic listening learning materials.	0 0%	0 0%	14 5.4%	94 36.0%	153 58.6%	4.53	0.598	High
E4	The augmented reality application should include video elements in the development of Arabic listening learning materials.	0 0%	0 0%	16 6.1%	97 37.2%	148 56.7%	4.51	0.612	High
E5	The augmented reality application should include text elements in the development of Arabic listening learning materials.	0 0%	0 0%	18 6.9%	92 35.2%	151 57.9%	4.51	0.612	High
E6	The augmented reality application should include animation elements in the development of Arabic listening learning materials.	0 0%	3 1.1%	22 8.4%	89 34.1%	147 56.3%	4.46	0.698	High
E7	The augmented reality	0	0	17	93	151	4.51	0.618	High

	application should include listening exercises in the development of Arabic listening learning materials.	0%	0%	6.5%	35.6%	57.9%			
E8	The augmented reality application should be developed according to learners' proficiency levels.	0	2	19	96	144	4.46	0.698	High
		0%	0.8%	7.3%	36.8%	55.2%			
E9	Learning Arabic listening skills through an augmented reality application should be accessible anywhere.	0	0	16	94	151	4.52	0.611	High
		0%	0%	6.1%	36.0%	57.9%			
E10	Learning Arabic listening skills through an augmented reality application should be accessible at any time.	0	0	18	90	153	4.52	0.624	High
		0%	0%	6.9%	34.5%	58.6%			
E11	Interaction between students and lecturers should be established during the teaching and learning process.	0	0	17	98	146	4.49	0.618	High
		0%	0%	6.5%	37.5%	55.9%			
E12	The augmented reality application can be used as an activity during the teaching and learning process.	0	1	14	94	152	4.52	0.617	High
		0%	0.4%	5.4%	36.0%	58.2%			
Total Mean							4.50	0.557	High

In addition, the findings highlight that students place strong emphasis on the ease of use of the application. This requirement suggests that usability is a critical factor in ensuring the effectiveness of learning applications. Radianti et al. (2020) also assert that user-friendly interface design is a key determinant of the effectiveness of immersive technologies in education. The findings related to the need for an application that can be accessed anytime and anywhere indicate that students expect flexibility in learning. This aligns with the concept of self-directed learning, where learners have control over the time and place of their learning. Most importantly, the findings reveal that students emphasize the need for applications to be developed according to their proficiency level. This suggests that students implicitly demand application design aligned with the CEFR A1 level. In this context, the application design should adhere to the principle of level-appropriate input, whereby learning content is structured progressively and does not exceed learners' capabilities. Therefore, these findings demonstrate that students have clear expectations regarding the design and development of AR applications, particularly in terms of multimedia integration, usability, and alignment with learners' proficiency levels.

Relationship between students' readiness and the design requirements of AR applications in learning Arabic listening skills

Overall, the findings indicate a clear relationship between students' readiness and the design requirements of AR applications in learning Arabic listening skills. The high level of acceptance of multimedia and AR suggests that students are prepared to adopt technological innovations in learning. However, this readiness should not be interpreted as a guarantee of learning effectiveness; rather, it must be supported by application design that aligns with pedagogical needs and learners' proficiency levels. The findings further demonstrate that students not only require the integration of multimedia elements such as audio and visuals but also emphasize usability, flexibility, and alignment with the CEFR A1 level. This indicates that the development of AR applications should be based on a user-centered design approach grounded in actual

learning needs. In this context, technology functions as a supporting medium, while learning effectiveness depends on how well the application design meets learners' cognitive and linguistic needs. Therefore, these findings reinforce that the integration of augmented reality in Arabic listening skills learning should be implemented systematically by incorporating students' readiness, pedagogical principles, and needs-based instructional design. Such an approach not only ensures the effective use of technology but also contributes to the development of a more meaningful and learner-centered learning experience.

Conclusion

This study investigated students' readiness and the design requirements for developing an augmented reality (AR) application to support Arabic listening skills at the CEFR A1 level. The findings reveal that students demonstrate a consistently high level of acceptance toward multimedia and AR-based learning, alongside clearly articulated expectations regarding the design features required to support their learning. These results suggest a critical shift in the discourse on educational technology integration: the primary challenge is no longer students' acceptance of technology, but rather the extent to which such technology is pedagogically aligned with learners' needs and proficiency levels (Baharudin and Mohamad, 2025; Brown, 2023). The study contributes to the growing body of research by highlighting that students are not merely passive users of technology, but informed stakeholders who expect meaningful, structured, and level-appropriate learning experiences. The strong emphasis on multimedia elements—particularly audio, visual, and interactive components—underscores the importance of multimodal input in facilitating comprehension at the beginner level (Chen et al., 2023; Mayer, 2021). Furthermore, the demand for applications that are user-friendly, flexible, and accessible reflects the need for learner-centered and context-sensitive design (Radianti et al., 2020). These findings reinforce the relevance of Multimedia Learning Theory and support the argument that effective technology integration must be grounded in sound pedagogical principles rather than technological novelty alone (Mayer, 2021).

From a pedagogical perspective, the findings provide important implications for language educators. The integration of AR in Arabic listening instruction should be approached systematically, ensuring that learning activities are aligned with CEFR A1 descriptors and structured progressively to match learners' cognitive and linguistic capacities (Council of Europe, 2020). Educators should also consider incorporating interactive and context-rich multimedia elements to enhance learners' engagement and comprehension (Garzón and Acevedo, 2023; Chen et al., 2023). From a design and development perspective, the study offers practical guidance for application developers. The findings highlight the importance of adopting a needs-driven and user-centered design approach, where usability, accessibility, and pedagogical alignment are prioritized (Baharudin and Mohamad, 2025; Brown, 2023). AR applications should not only integrate multimedia elements but also ensure that these elements function cohesively to support learning objectives (Mayer, 2021). In this context, technology serves as an enabling medium, while instructional design remains the determining factor for learning effectiveness.

At the theoretical level, this study extends the application of needs-driven design in the context of AR-based language learning, particularly for Arabic listening skills at the

beginner level. It emphasizes the importance of aligning technological affordances with learners' readiness and instructional goals, thereby bridging the gap between technology acceptance and pedagogical effectiveness (Baharudin and Mohamad, 2025; Brown, 2023). Despite these contributions, the study is limited to examining students' readiness and perceived design requirements. It does not empirically evaluate the effectiveness of a fully developed AR application on learning outcomes. Therefore, future research should focus on experimental or quasi-experimental studies to assess the impact of AR-based applications on students' listening proficiency. In addition, further studies may explore longitudinal effects, different proficiency levels, and diverse learning contexts to enhance the generalizability of the findings. In conclusion, the successful integration of augmented reality in Arabic listening skills learning requires more than technological innovation; it demands a balanced synergy between learners' readiness, pedagogical principles, and needs-based instructional design (Baharudin and Mohamad, 2025; Garzón and Acevedo, 2023; Brown, 2023). Such an approach ensures that AR functions not merely as an innovative tool, but as a meaningful and effective medium for enhancing language learning experiences.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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