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Research

Instructional Design of an AI-Assisted Interactive Digital Module Based on Meaningful Learning for Arabic Speaking Skills in an Urban living Context

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Abstract
This study aimed to develop an instructional design framework for an artificial intelligence (AI)-assisted interactive digital module grounded in meaningful learning to support beginner Arabic speaking instruction in urban living contexts. Using Educational Design Research (EDR), the study focused on two phases: analysis and exploration, and design and construction. Participants included 50 first-year Arabic Language Education students enrolled in the Kalam lil Mubtadi course at Universitas Negeri Jakarta. Data were collected through questionnaires, classroom observations, semi-structured interviews with three lecturers and ten students, and instructional document analysis. Quantitative data were analyzed using frequencies and percentages, while qualitative data were examined through collaborative coding and source triangulation. Results revealed that 88% of students strongly reported difficulties expressing ideas orally, 84% required authentic speaking situations, and 82% expressed a need for AI-supported independent practice. These findings informed a seven-unit instructional blueprint integrating authentic urban communication contexts, interactive multimedia, AI-assisted speaking activities, and three meaningful learning strategies: advanced organizers, progressive differentiation, and integrative reconciliation. The proposed framework demonstrates how meaningful learning principles can systematically guide AI integration by connecting prior knowledge, contextual communication, guided practice, and reflective feedback. However, the study was limited to preliminary design phases within a single institution, and its instructional effectiveness remains untested. Future research should prioritize expert validation, classroom implementation, and empirical evaluation of students' Arabic speaking performance.

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Introduction

Recent systematic literature reviews show that Artificial Intelligence (AI) is a significant trend in education especially in language teaching, as it assists in adaptive and learner-centre instructional models. Personalized learning support and real-time feedback, monitoring learners and providing simulated communication can be presented by artificial intelligence technologies such as Intelligent Tutoring Systems (ITS), Natural Language Processing (NLP), Automatic Speech Recognition (ASR), and conversation agents as well as adaptive learning platforms (Kazimova et al., 2025; Yan et al., 2025). Yet, the educational quality of AI does not solely rely on technology but also on the pedagogical design and implementation, as there are issues regarding ethics, data privacy, algorithmic bias, infrastructure, and pedagogical competence of the teachers (AlTwijri & Alghizzi, 2024). This view

forms the basis of AI-assisted learning which positions AI as a part of teaching and learning to support but not supplant human teaching and learning (Bolick & da Silva, 2024; Chai et al., 2025; Kayal, 2024; Tapalova & Zhiyenbayeva, 2022; Wang & Li, 2026). Applications of AI-assisted learning to language learning have also risen, such as conversational AI to personalized language practice, authentic language communication, and formative language learning feedback (Mohebbi, 2025; Pang et al., 2026). These applications suggest that the value of AI in education is more than its capabilities to compute and they can be used to create educationally based learning experiences that are interesting, accessible, responsive to the needs of diverse learners (Asy'ari & Sharov, 2024; Chalkiadakis et al., 2024; Ejjami, 2024). Nevertheless, past researchers primarily analyze the impact of AI on the learning outcomes (Kibar & Ilgaz, 2026; Qian & Hassan, 2025; Weng et al., 2024) and the interactions of learners with AI, whereas there is a limited variety of research analyzing how AI can be systematically incorporated into the instructional design and taught through explicit learning theories. This gap highlights the necessity of instructionally-based pedagogical frameworks of instruction design that can support both systematic implementation of AI to facilitate meaningful, learner-centred, and sustainable learning experiences (Kong & Yang, 2024; Zou et al., 2025). In Arabic language education, this pedagogical integration is particularly relevant to speaking instruction, which requires sustained opportunities for oral practice, communicative interaction, and feedback. Research on Arabic speaking instruction has identified persistent challenges, including grammar-oriented teaching, limited communicative practice, passive learning cultures, and insufficient Arabic-speaking environments (Nurpadilah et al., 2026; Syaikhudin & Laili, 2024). These conditions highlight the need for instructional designs that connect Arabic speaking practice with learners' prior knowledge, experiences, and meaningful communicative contexts (Nuraini et al., 2026)

In the field of learning theory, meaningful learning theory is particularly relevant to the design of learner-centred instructional experiences. The theory conceptualizes meaningful learning as a process in which new knowledge is connected to learners' prior knowledge and existing cognitive structures rather than acquired through rote memorization. Learning therefore involves active cognitive processes through which learners assimilate new ideas with existing knowledge and construct coherent conceptual understanding, leading to deeper understanding and more meaningful learning outcomes (Abah & Vilakazi, 2026; Dhahi et al., 2025). These principles provide a systematic pedagogical basis for designing learning experiences that emphasize active knowledge construction and conceptual integration rather than memorization. In the context of AI-assisted learning, meaningful learning theory can guide the pedagogical integration of AI by ensuring that AI-supported activities remain connected to learners' prior knowledge, experiences, and learning objectives. Thus, meaningful learning theory provides a theoretically grounded basis for integrating AI into instructional design while maintaining meaningful, learner-centred, and sustainable learning experiences (Kong & Yang, 2024; Zou et al., 2025).

Speaking is considered one of the most demanding language skills because learners need to coordinate linguistic knowledge, cognitive processes, and communication skills simultaneously during interaction (Chou, 2024; Windriya et al., 2025). Effective speaking involves not only knowledge of vocabulary and grammar but also accuracy, fluency, communicative competence, and the ability to express meaning appropriately across different communicative situations (Mehraliyeva, 2025; Zega, 2025). This communicative nature of speaking requires learners to

activate and apply previously acquired language knowledge while engaging with new communicative tasks, situations, and experiences (Jaramillo, 2021; Jaramillo Cherrez & Nadolny, 2023). Such a process is consistent with meaningful learning theory, in which new knowledge is constructed by relating new concepts and experiences to learners' existing conceptual structures and prior knowledge (Bryce & Blown, 2024). Teaching of Arabic in terms of meaning should therefore involve giving learners authentic and contextual communicative situations where the learners are able to apply their prior linguistic knowledge, expose themselves to new language intake, construct meaning, and gradually anchor and align new knowledge to what they already know. This type of learning experience can be used to negotiate meaning, practice speaking continuously and provide meaningful feedback, which can lead to the acquisition of communicative competence.

In the learning of the Arabic language, the mastery of speaking skills goes beyond correct Arabic language to effective speaking in the actual social and cultural contexts. As a consequence, teaching Arabic as a second language must afford the pupils the means to apply the language to contexts related closely to their daily experiences so that linguistic facts previously learned can be related to communicative functions that have real meaning as opposed to having the pupils engage in a vacuum when it comes to the language. The recent research has highlighted the importance of contextualized learning of the Arabic language, engaging in communicative activities, and real-life learning experience, which can contribute to active involvement of the learner, construction of meaningful knowledge, and communicative competence development in real-life situations (Gusma et al., 2025; Qureshi et al., 2022; Rosyad & Kabir, 2025). This study builds on this relationship between the prior knowledge, authentic communication and meaningful learning by adopting an urban living context as an authentic contextual framework to teach the Arabic speaking. The context of the urban urban living context positions speaking activities in the context of familiar social, communicative situations that are pertinent to the daily experiences of the learners to facilitate their connection of previous knowledge to new communicative experiences. It also offers contextual foundation of developing an interactive digital module underpinned by AI, where speaking activities, learning materials, as well as AI-assisted interactions are orchestrated over significant real-life experiences.

In order to further inform the instructional design to the target learning context, the preliminary needs analysis was performed on Arabic Language Education program at Universitas Negeri Jakarta. In the analysis, the needs in students in relation with their speaking task, current instructional practices, learning resources, and access to contextualized and self-regulated speaking practice were studied. The observed classroom settings and interviews carried out between October and November 2025 revealed that the current teaching resources lacked an adequate responsiveness to the daily urban life of students, as teaching was relatively reliant on the traditional printed version of textbooks, and students had only few chances to speak on their own. The conditions create a necessity to have an instructional design which is more responsive to learning contexts and communicative needs of learners. Learning designs have been suggested in previous studies and they included AI-assisted learning, digital learning module, meaningful learning theory, and contextual language learning. Nevertheless, these research works concentrated on single elements of instruction or technology applications instead of systemic design of instructing based on pedagogical theory, artificial intelligence provided learning technology, real-world urban settings, and interactive online courses to teach Arabic speaking.

Over the past couple of years, there has been an increase in the amount of literature on the concept of instructional design as one of the ways to combine technology and pedagogy to enhance the learning experience. Research of AI-infused instructional design has shown that AI can aid in instructional planning, design of learning, and technology-mediated learning promptly, yet teachers keep their roles in pedagogical decision making (Alwakid et al., 2025; Weng et al., 2024). Likewise, instructional designs which have been based on meaningful learning theory have focused on systematic connections amid the learning goals, preceding information, and real world contexts to promote meaningful knowledge building (Andayanie et al., 2025; Nurhasanah et al., 2022). Other research has created multimedia-based interactive digital learning modules including interaction between the learner, formative assessment, and feedback to facilitate independent learning experiences (Mahendri et al., 2023; Rahadi et al., 2025). Studies on the Arabic language education have also highlighted instructions design systematic and communicative learning, contextual instructions, multimedia, structured developmental processes especially in the instruction of speaking (Saleh et al., 2025; Sarbaini & Rahmi, 2024). Collectively, these studies offer pertinent backgrounds about incorporating instructional planning, pedagogical theory, digital learning resources and Arabic speaking instruction. They however treat these dimensions mainly in their respective areas of instructional or technological emphasis and do not treat of relationships between these dimensions in a comprehensive way within one instructional design framework.

Taken together, the reviewed studies provide important but complementary foundations for the present research. The literature demonstrates the potential of AI to support instructional planning and technology-enhanced learning, establishes meaningful learning as a basis for connecting learning objectives with prior knowledge and authentic contexts, highlights the role of interactive digital modules in supporting learner interaction and independent learning, and emphasizes the importance of communicative and contextualized instructional design in Arabic speaking instruction. However, the theoretical relationship among these dimensions remains insufficiently articulated. In particular, limited attention has been given to how meaningful learning principles can function as an organizing pedagogical foundation for determining the role of AI, structuring speaking activities, connecting learners' prior knowledge with authentic urban contexts, and organizing interactive digital resources within a coherent instructional design. From a design perspective, there is also limited guidance on how these elements can be systematically aligned across learning objectives, learning activities, AI-supported interactions, multimedia resources, and independent learning opportunities in Arabic speaking instruction. Thus, the gap is not simply the absence of individual components, but the limited articulation of how these components can be theoretically and instructionally aligned within a coherent design framework. Addressing this gap, the present study proposes an instructional design framework for an AI-assisted interactive digital module grounded in meaningful learning and situated in an urban living context for Arabic speaking instruction.

Hence, this study aims to propose an instructional design framework for an AI-assisted interactive digital module for teaching Arabic speaking in an urban living context grounded in meaningful learning theory. Specifically, the study aims to systematically integrate pedagogical principles, AI-assisted learning, contextualized learning experiences, and interactive digital learning resources into the instructional design to support meaningful Arabic speaking learning. The study focuses on the initial EDR processes of analysis and exploration and design and construction,

resulting in a proposed instructional design framework and blueprint that provide a theoretical and practical basis for the subsequent development and validation of the instructional module.

Method

This study employed an Educational Design Research (EDR) approach to address a practical and complex problem in Arabic speaking instruction through the systematic development of a pedagogically grounded instructional design. EDR is characterized by an iterative and flexible process comprising three interrelated core processes: analysis and exploration, design and construction, and Evaluation and Reflection (McKenney & Brand-Gruwel, 2023; McKenney & Reeves, 2025). These processes do not necessarily proceed in a fixed linear sequence, as EDR allows researchers to move iteratively and flexibly between processes in response to emerging empirical and design considerations (McKenney & Reeves, 2025). Its design-oriented nature is also consistent with previous research emphasizing the development of educational products and innovations based on theoretical and empirical considerations (Lutfiyatun et al., 2023). In the present study, the reported EDR trajectory is limited to the first two processes, namely analysis and exploration and design and construction. The analysis and exploration process examined the instructional problem, learning context, learner characteristics, preliminary learning needs, and relevant theoretical foundations through a preliminary questionnaire, classroom observations, semi-structured interviews, document analysis, and a literature review. The design and construction process translated these findings into an instructional design framework and blueprint for an AI-assisted interactive digital module for Arabic speaking instruction in an urban living context. The design specified learning objectives, content organization, speaking activities, the advanced organizer strategy, progressive differentiation strategy, and integrative reconciliation strategy, ai-assisted learning activities, interactive multimedia resources, independent learning opportunities, and assessment and feedback strategies. Thus, this article focuses specifically on the initial EDR trajectory from analysis and exploration to design and construction, while the subsequent evaluation and reflection process is beyond the scope of the present article.

The experiment was undertaken in the Arabic Language Education research project, Universitas Negeri Jakarta (UNJ). There were 216 first-year students in six classes taking the Kalam lil Mubtadi course. Purposive sampling was used in the selection of two classes (Class A and Class B) by virtue of the fact that their students were relatively similar in terms of their Arabic speaking ability. The preliminary questionnaire was administered to all 50 students in the classes that were selected which were 25 students each. Semi-structured interviews with three Kalam lil Mubtadi lecturers and ten students were carried out as well with each participant being a student of a single class and five students of the same classes being chosen based on relatively similar scores of Kalam achievement. This type of sampling strategy gave the information related to the instructional issue and characteristic of the target learners. The research was carried out in balance with the principles of research ethics used at UNJ as evidenced by a self-assessment ethical clearance document. Oral presentation of study purpose, data use, and procedures together with confidentiality of information was given before data collection and participation was voluntary. The identity of the participants was concealed with the help of numerical codes, and research data were safely stored and could be accessed by the researcher only. At such a phase as mentioned in this article, AI-aided speaking exercises were not implemented yet; hence, voice data were not obtained using AI platforms. Only the proposed instructional design and module blueprint were included with AI-assisted learning.

Data were collected through a preliminary closed-ended questionnaire, classroom observations, semi-structured face-to-face interviews, and document analysis. The questionnaire consisted of 10 items using a five-point Likert scale ranging from strongly agree to strongly disagree, covering four areas: Arabic vocabulary ability, speaking and pronunciation difficulties, opportunities for independent speaking practice, and learning needs. The questionnaire underwent content validation by one expert, namely the coordinator of the *Kalam lil Mubtadi'* teaching team. Classroom observations included participant and non-participant observation. Participant observation was conducted by the researcher as the course lecturer to directly observe students' learning activities and difficulties, while non-participant observation was conducted in two sessions in other classes to provide an additional perspective. The observation instrument covered the learning process, student activities and responses, learning difficulties, learning resources, and teaching methods. Semi-structured interviews with three lecturers and ten students explored the existing Kalam learning process, learning experiences, instructional challenges, and learning needs; the interview questions were reviewed through peer discussion within the research team. Relevant curriculum documents, course learning outcomes, teaching materials, and other instructional documents were also examined to inform the proposed design.

Quantitative questionnaire data were analysed using descriptive statistics by calculating frequencies and percentages of responses. Qualitative data from classroom observations, semi-structured interviews, and document analysis were analysed using data reduction, data display, and conclusion drawing based on the Miles and Huberman approach (Qomaruddin & Sa'diyah, 2024). Coding and qualitative interpretation were conducted collaboratively by three members of the research team, with source triangulation used to compare evidence across questionnaires, observations, interviews, and instructional documents. The findings were synthesized to identify recurring instructional problems, learner characteristics, learning practices, curriculum requirements, contextual needs, and expectations concerning AI-assisted learning and meaningful learning. These findings were then translated into design requirements by considering converging empirical evidence, curriculum requirements, learner characteristics, and relevant theoretical principles. The resulting requirements informed the learning objectives, content organization, speaking activities, meaningful learning strategies, AI-assisted learning activities, interactive multimedia resources, independent learning opportunities, and assessment and feedback strategies. This evidence-based translation of findings into instructional requirements is consistent with the role of analysis in informing subsequent instructional design decisions reported in previous research (Spatioti et al., 2022). The design requirements that resulted created the foundation of the proposed instructional design framework and blueprint, which was then narrowed down by early expert appraisal.

Result and Discussion

Analysis and Exploration (EDR Process 1): Instructional Needs and Design Requirements

The Analysis and Exploration process was implemented to determine the instructional issues, teaching attributes, perceived needs to be learned, current instructional approaches, and situational needs based on designing an AI-based interactive online course to Arabic speaking teaching. The information was received on the basis of a preliminary questionnaire with 50 students, classroom observations, semi-structured interviews with lecturers and students and analysis of the

instructional documents related to their topics. Results of these sources were then synthesized using source triangulation to ascertain any commonalities and to develop precursory design requirements.

Preliminary Questionnaire Findings

The pre-test questionnaire had 10 items of closed-ended questions with a five-point Likert scale of strongly agree, strongly disagree, disagree, neutral, like, and strongly like. The things covered four areas: Arabic vocabulary competence, speaking and pronunciation problems, access to independent speech practice and perceived learning requirements.

Table 1. Preliminary Questionnaire Findings

Aspect	Item	Strongly agree
Arabic vocabulary ability	Students perceived their Arabic vocabulary as insufficient.	72%
	Students perceived a need for additional Arabic vocabulary and expressions to support everyday speaking.	80%
Speaking and pronunciation difficulties	Students perceived difficulties in pronouncing Arabic sentences.	68%
	Students perceived difficulties in expressing ideas, experiences, or opinions orally in Arabic.	88%
Independent speaking practice	Students perceived that opportunities for speaking practice in class were limited.	87%
	Students perceived a need for additional practice to improve pronunciation accuracy and speaking fluency.	88%
Perceived learning needs	Students perceived a need for opportunities to practice Arabic speaking through situations resembling real-life communication.	84%
	Students perceived a need for Arabic speaking materials related to urban life and close to their experiences as university students.	88%
	Students perceived that they could understand new Arabic material more easily when it was connected to their existing experiences or knowledge.	86%
	Students perceived a need for AI as a learning partner for independent Arabic speaking practice.	82%

The results of the questionnaires suggest that there are a number of perceived instructional requirements. To begin with, vocabulary was determined as a significant area of further assistance. Three-fifths of students (72%) strongly responded that they still felt their vocabulary was inadequate in Arabic, and that a greater number (80%) strongly agreed that they needed more vocabulary and phrases to help them speak in everyday life. These reactions demonstrate that there is a perceived necessity that vocabulary needs to be enriched that has a direct relation to oral communication. Second, students cited problems concerning oral production. Sixty eight percent of them agreed strongly that they had problems with pronunciation when speaking in Arabic and 88% agreed strongly that they had problems in conveying ideas, experiences or opinions using their voices in Arabic. The results hence show perceived requirements that are not merely to do with pronunciation but to capability to make and articulate sense in the process of oral communication.

Third, the results show that it is perceived that opportunities to practice speaking are limited. Eighty-eight percent of students strongly agreed that speaking practice opportunities in the classroom were not available, and eighty-eight percent of them strongly agreed that they required more speaking practice to ensure higher accuracy of pronunciation and fluency when speaking. This indicates that students felt that they needed more frequent and repeated oral practice, especially

beyond the constrained time they had to interact with each other in the classroom. The learning-needs items also imply the significance of contextualized learning. A majority of students (84%) strongly assented that they had to get a chance to practice speaking by using situations that are similar to real life communication and 88% strongly asserted that they had to be provided with Arabic speaking materials that are in the context of the urban life and also be close to their experiences as college students.

Moreover, 86% resoundingly conferred that they were more likely to learn new Arabic material easier when related to their previous experience or knowledge. These results can be empirically observed to justify the need to focus on authentic contextualization and relationship between prior and new knowledge in subsequent learning design process. In the case of AI, 82% of the students were in strong agreement that they required AI as one of their partners in terms of independent practice in speaking the Arabic language. This outcome must be considered as a perceived learner requirement and expectation, but not an indication of AI effectiveness. It, however, offers an empirical foundation of viewing AI-assisted activities as one of the elements of the suggested instructional design, specifically to extend the opportunities of independent speaking practice. In total, the questionnaire revealed four related areas of perceived need, including vocabulary and oral-expression, more frequent opportunities to practice speaking, learning context on Urban experiences of students, and further support of independent learning, such as the possible assistance of AI.

Classroom Observation Findings

The results of the questionnaires were supplemented by classroom observations made during the teaching of *Kalam lil Mubtadi*. The observations considered the learning process, lecturer and student activities, the *Maharah Kalam* instruction, learning context, meaningful learning, teaching materials, learning media, AI-assisted learning, independent learning, the instructional problems and technology availability. Observations revealed that the course was applied regarding the CPMK and the learning objectives outlined in the RPS, and the students had a chance to speak Arabic. There was, however, a constraint in the number of opportunities to speak which students could get given that they practiced one-by-one in the time available in the classroom. Lecturers engaged in an active presentation of material, examples, instructions, organization of speaking activities and feedback. However, since the majority of feedback was offered in the face-to-face instruction, there was little opportunity to receive personalized support during out of classroom hours. There was also uneven participation by the students. More active participation was observed among students who were more confident and those who could easily do the talking, however, other students needed more practice before speaking. Even in spontaneous speaking tests, students still had to be assisted in making vocabulary choices and composition. The same observation on Maharah Kalam activities revealed that vocabulary use was still highly related to the available textbook material whereas pronunciation practice could not be currently rigorous and autonomous.

The observations also indicated Al-Arabiyah Baina Yadaik and Al-Arabiyah lil anilam were the acquired primary learning sources. In spite of the themes in these materials being connected with daily life, the contexts might be further expanded to the situations that are more related to students urban life, such as buses, college, restaurants, social services, entertainment, and online shopping. In terms of meaningful learning, the relationships between learning material and the experiences of students were already there through questioning and classroom interaction, yet relationships were

not systematically organized yet. The results thus reveal a new possibility of presenting learning more clearly based on links between previous knowledge, new content, practice, and reflection. In the area of technology, AI was not yet incorporated in the lesson that was witnessed on teaching Arabic speaking. Lecturer and student interaction continued to be the most important means to promote speaking practice and feedback. Simultaneously, students were available to the digital devices which meant that there was a contextual possibility of offering them with further digital learning support outside the classroom.

Interview Findings

The semi-structured interviews provided further explanation of the questionnaire and observation findings. The lecturer interviews indicated that *Kalam lil Mubtadi'* already incorporated dialogues, question-and-answer activities, pronunciation practice, and individual and pair communication. However, limited classroom time restricted opportunities for intensive and repeated speaking practice. Lecturers also identified difficulties related to vocabulary mastery, pronunciation, speaking fluency, and spontaneous idea development. The lecturers further indicated that the existing textbooks provide a systematic foundation through vocabulary, expressions, dialogues, language structures, and language activities, but additional materials were needed to provide more varied speaking situations and support more spontaneous language use.

They also identified urban contexts such as campus life, transportation, restaurants, residence, public services, entertainment, and shopping as relevant situations for speaking practice. The interviews also supported the relevance of meaningful learning. Lecturers considered connections between learning materials and students' experiences important, although the relationship between prior knowledge, new material, communicative application, and reflection was not yet systematically structured. Lecturers also viewed AI as having potential to extend Arabic speaking practice beyond classroom hours, particularly as a learning partner for conversation practice, vocabulary and expression development, and feedback.

Student interviews also revealed such problems as the inability to memorize and choose vocabulary, pronunciation, fluency, and to develop ideas spontaneously. Students articulated the desire to have more diverse communication scenarios that were more similar to their real-life experiences. They also felt interested in applying AI in conversation practice, support in vocabulary and expressions, support in correcting and feedback and learning independently.

Triangulation of Analysis and Exploration Findings

The data presented in the questionnaire, classroom observations, interviews, and the analysis of documents proved convergent patterns among the sources of data. To design the instruction, the triangulation found six areas, all connected to each other, such as Maharah Kalam, urban life, meaningful learning, AI-supported learning, interactive digital learning, and the learner independence and flexibility.

Table 2. Triangulated Findings and Initial Design Requirements

Aspect	Converging evidence	Initial design implication
Maharah Kalam	Limited speaking opportunities and difficulties with vocabulary, pronunciation, fluency, and spontaneous oral expression	Provide gradual, repeated, and contextualized speaking practice

Urban Living	Need for communication situations close to students' everyday urban experiences	Organize speaking activities around *Urban Living* contexts
Meaningful Learning	Need to connect new material with prior knowledge and experience	Integrate Advanced Organizer, Progressive Differentiation, and Integrative Reconciliation strategies
AI-Assisted Learning	Perceived need and lecturer/student interest in conversation practice, feedback, and independent practice	Position AI as a potential *learning partner* for speaking practice and feedback
Interactive Digital Module	Need for text, images, audio, video, and interactive activities	Develop an integrated multimodal digital learning environment
Independence and Flexibility	Limited opportunities to practice outside classroom hours	Provide repeatable, flexible, and self-directed speaking activities

Triangulation shows that the nature of the identified needs was not based on the one data source. Instead there were common trends in questionnaire data of students, observations in classes, Lecturer and student interviews, and instructions. The results were always shown to align with the necessity of increasing speaking opportunities, diversifying contexts of communication, linking new learning to the previous experiences of the students, offering more support to speaking practice and feedback, and facilitating learning outside of the classroom time. Notably, AI was not perceived like a solution that has already been tested by the triangulation. Rather, the questionnaire and interview results reveal that there is a perceived need and contextual opportunity of AI-assisted learning, and the observations prove that AI had not been systematically incorporated into the existing instruction yet. This difference helps to position AI as a design element to be implemented and then explored, but not as an effective intervention that is already proven to be effective. Based on the converging findings, the needs identified in the analysis and exploration process were translated into initial design requirements for the subsequent design and construction process. These requirements concerned learning objectives, content organization, urban living contexts, *Maharah Kalam* activities, meaningful learning strategies, AI-assisted learning activities, interactive multimedia features, and independent learning support.

Design and Construction (EDR Process 2): Instructional Design Framework and Module Blueprint

The needs analysis findings were used to make the instructional design developed in this study, which was formulated based on four complementary instructional components: meaningful learning theory, AI-assisted learning, authentic urban living contexts, and interactive digital module design. These components do not operate as stand-alone but rather comprise a unified pedagogical system that tackles the identified challenges in the analysis phase and facilitates the acquisition of Arabic speaking skills.

The analysis and exploration process identified the design requirements that were then converted into a proposed instructional design framework of teaching Arabic speaking to students. The framework incorporates four integrated components meaningful learning, AI-based learning, real-life urban living situation, and interactive online module design- an integrated pedagogical framework to meet the instructional demands defined in the initial EDR process, and promote Arabic speaking development. It is based on a meaningful learning theory by David Ausubel which focuses on the process of constructing new knowledge based on its relation to the convictions of learners and their previous knowledge (Bryce & Blown, 2024; Dhahi et al., 2025; Nurhasanah et al., 2022). On this

theoretical basis, the current design operationalizes three complementary instructional strategies, which are: advanced organizer strategy, progressive differentiation strategy and integrative reconciliation strategy. Advanced organizer strategy involves activation and organisation of the relevant existing knowledge before the new learning by the use of contextual videos, concept maps, visual prompts and introductory speaking activities; the progressive differentiation strategy involves acquisition of new language knowledge by the use of rather general concepts to more specific applications in communication through vocabulary, expressions, dialogues and guided speaking activities; and the Integrative reconciliation strategy involves referencing new knowledge to existent knowledge of the learner through contextualised speaking, comparison, problem solving, reflection and self-evaluation activities. In the current instructional design, these strategies are thus addressed as a sequence of instructions based on the similar ideas of instruction, which constitute a sequence of conveying every prior communication to subsequent one, with the completion of the sequence progressing to differentiation of new knowledge, and the integration and the meaningful application of the new knowledge into communicational purposes.

In this context, AI-assisted learning will be implemented as a close-ended learning support, but not as an autonomously adapting teaching system. The proposed design incorporates AI-enabled conversational learning tool that helps to provide guided speaking practice by using a structured prompting workflow in accordance with the three instructional strategies. The prompt submitted at the behavior of the advanced organizer stage instructs the AI to mobilize the prior knowledge of the learners (or their former experiences and general knowledge on the subject) by making questions on it. During the progressive differentiation phase, a learner is directed to apply newly added expressions and words to more narrow conversations, and the AI responds and offers corrective responses depending on the production of language by learners. The prompt at the stage of Integrative reconciliation encourages learners to take time to reflect on their learning experience, find points of difficulty, and reflect on how their newly acquired language could be applied to their communicative experience. The triggering workflow also defines the feedback process: the AI is told to find wrong or unsuitable use of language, give an improved version, justify why the improvement is needed, score his/her performance on a scale 1–10 with a small explanation, and give a recommendation on how it can be improved later. In this way, the prompt is not only a guide of the conversation-generating process, but a systematic pedagogical process that interrelates the AI-guided interaction with speaking practice and the correct feedback, reflection, and following learning advancement.

Urban living is another key element of the framework, in the sense that it is the real-life context in which learning is taking place. The speaking activities cover communicative contexts relevant to the everyday lives of university students such as public transport, eating out, university life, accommodation, public services, leisure and online shopping. The familiar contexts allow learners to link the language they learn with their real-life experiences and support the principles of meaningful learning and authentic communication.



Figure 1. Design Requirements Matrix for the Proposed Instructional Design Framework

The proposed framework is operationalized through the design of an interactive digital module entitled *Al-ʿArabiyyah Al-Muʿāṣirah*, which brings the proposed pedagogical components together within an integrated learning environment. Each unit is structured around the three meaningful learning strategies advanced organizer, progressive differentiation, and integrative reconciliation and incorporates multimedia resources, structured speaking activities, AI-assisted learning tasks, formative reflection, and opportunities for independent learning. The module is therefore designed not merely as digital learning material, but as an instructional environment that operationalizes the proposed instructional design for meaningful Arabic speaking learning in an urban living context.

Alignment of Learning Outcomes and Instructional Objectives

The instructional design developed in this study was systematically adapted to the curriculum of the Arabic Language Education study program so that each of the aspects of the curriculum was in accordance with the learning outcomes. The program curriculum, program learning outcomes, course learning outcomes, educational goals, teaching activities and assessment plans were arranged in a hierarchical sequence to develop the module. This alignment was designed to ensure consistency between curriculum-based expected competencies and interactive digital module instructional experiences.

The Arabic Language Education study program is based on Outcome Based Education (OBE) and has a learning approach that combines with the use of technology, student learning, and digital literacy education to produce graduates who are able to adapt to today's educational and professional environments. In addition, the curriculum emphasizes the need to learn collaboratively, to gain digital competence, and to incorporate information technology in Arabic language teaching, which creates an institutional basis for the development of technology-supported instructional materials.

The suggested instructional design specifically correlates with the Program Learning Outcomes (PLOs) in Arabic language skill and teaching skill. The first learning outcome requires the students to be competent in both receptive and productive Arabic language skills, and to use them for language learning, research and in professional contexts. The other related learning outcome

highlights the design and implementation of Arabic language instruction, which involves the use of technology to develop a learning environment that is learner-centred, creative, digitally literate and of high quality, and then evaluates it. These learning outcomes give the pedagogical guidance to design of learning experiences that lead to learning outcomes in Arabic speaking competence and digital learning skills.

Drawing on these requirements, the design of teaching was then translated into the learning outcomes of the *Kalam lil Mubtadi'* course. The course has been designed to encourage the first-year students to communicate orally by using adequate vocabulary, expressions, pronunciation and communicative strategies in common situation in Arabic language. Because the participants in the current study were the beginner learners, the instructional objectives were stated gradually starting with simple communicative functions and then moving to more complex speaking performance. This gradual progression is partly because of novice learners' developmental nature, and partly because of the hierarchical organization proposed by meaningful learning theory.

Instructional objectives are also formulated according to the pedagogical principles used in formulating the proposed instructional framework. With this in mind, every instructional objective was written to support meaningful communication in authentic contexts and not to focus on memorization of vocabulary and grammatical structures. Students were thus asked to use new words and phrases correctly in oral communication, retell their own experiences, make comparisons, solve simple, communicative problems and think about their learning experiences. These goals foster the development of knowledge by means of meaningful communication, not only by means of language practice.

The pedagogical sequence is consistently applied across all instructional units of the module to ensure alignment between the instructional objectives and learning activities. To connect new learning with prior knowledge, each unit begins with the advanced organizer strategy, which activates and organizes learners' relevant prior knowledge. This is followed by the progressive differentiation strategy, through which learners are introduced to new vocabulary, dialogues, and communicative expressions and progressively apply them in increasingly specific speaking activities. The integrative reconciliation strategy then enables learners to integrate the newly acquired knowledge with their prior knowledge through extended speaking activities, contextual communication, reflection, and AI-assisted feedback. This sequence ensures that each instructional objective is supported by appropriate learning activities that progressively guide learners toward the development of meaningful Arabic speaking competence.

Instructional objectives were also matched to the real-world situations illustrated within the urban living theme. Instead of presenting grammar topics in isolation, the units were based on the communicative contexts that are a natural part of university student's daily life, such as in public transportation, restaurants, the university, housing, public services, entertainment, and on the Internet. These contextual themes offer purposeful contexts where students can spontaneously use new words and phrases they learn and simultaneously enhance the link between what they already know and new learning contexts. This contextual organization also strengthens the principles of meaningful learning, by placing language learning in the lives of learners.

Another key consideration for the alignment process is the incorporation of AI-supported learning in learning outcomes. AI was not being used as a standalone technological aspect, but rather as a tool to support learning that would help students reach a certain learning goal. In the teaching

and learning process, AI can help activate the previous knowledge, carry out conversations, correct pronunciation, enrich vocabulary, provide corrective feedback, and reflect on learning. As a result, AI is not just a secondary educational technology but a pedagogical tool that aids the learning outcomes of the desired instruction.

Constructive coherence across the instructional design is ultimately created through the alignment of learning outcomes and instructional objectives. The competencies to be achieved are determined by the curriculum expectations, instructional objectives are derived from the competencies, meaningful learning theory guides the learning process, the urban living theme offers authentic communicative contexts, AI-assisted learning enables individualized interaction and the interactive digital module brings all the elements of the learning together in a single learning environment. This alignment process is shown in figure 2.



Figure 2. Alignment of Learning Outcomes and Instructional Objectives

The systematic alignment in this study differs from many digital learning materials available which often focus on the development of content or the use of technology, but fail to make the relationship with the curriculum outcome evident. According to this model, the first step in instructional design is curriculum alignment, which considers that all of the pedagogical choices, including learning outcomes and activities facilitated by AI, should be aligned with the target competencies. This correspondence validates the theoretical congruence and viability of the teaching design of Arabic speaker teaching.

Organization of Learning Content

The arrangement of learning material was structured so as to meet the needs of cognitive constructs which were based on the theory of meaningful learning and the communicative needs of students in learning Arabic for beginners. The module does not aim to present grammar content in isolation but rather themes that provide a meaningful context for living in an urban environment, similar to that of the university student. Thematic organization was designed to facilitate meaningful knowledge construction by allowing the learners to relate the new Arabic language expressions in a way that

they can associate with the familiar communicative situations they encounter in their daily life in the cities. In the end, the instructional sequence created helps the students develop communicative competence gradually and helps them be contextually authentic throughout the learning process.

Content organization is composed of seven instructional units which are the most frequent communicative situations in a city: public transportation, restaurant, university life, residential environment, public services and city life, entertainment places and online shopping. The themes have been chosen because they represent normal communication situations which are important for the students and where they can use the spoken Arabic in meaningful contexts. Language structures are not introduced separately but each unit places vocabulary, expressions, dialogues and speaking activities in realistic situations that learners are likely to encounter outside of class. Through this contextual organization, a link between what has been learned and known is increased, as is one of the main principles of meaningful learning theory.

The lessons were deliberately structured from relatively simpler communicative contexts to more complex interactional contexts. In the first unit, Public Transportation, students will learn how to interact with others in basic ways such as asking for directions, describing a trip and talking about transportation options they took. The communicative situations were chosen, firstly, because they are situations which most students in the university undergo regularly, and secondly, because they are situations which give easy opportunities for activating the prior knowledge before introducing new vocabulary and expressions. The next unit, Restaurant, further develops communicative competence through learners' participation in transactional communication with actors in the restaurant, ordering food, paying with electronic devices and requesting service. This development will increase the communicative range of learners in a gradual manner with continuity to the urban life.

The third and fourth units of instruction expand students' communicative competence by introducing the topics of university life and residential environment. Themes prompt students to talk about everyday life, school life, surroundings and homes, using more and more varied vocabulary and phrases. These units go beyond question and answer to introduce extended spoken discourse to allow learners to talk about their own experiences, compare different situations, and describe familiar environments. Learners over time therefore shift from sentence level production to more coherent oral communication.

The last two instructional units, public services and city life and entertainment places, present more communicative situations involving more interaction and decision-making. Students must converse when they are using public services, asking for information, dealing with practical problems, giving opinions and talking about leisure activities in real city environments. These themes encourage students to communicate more effectively as they must not only provide factual information but also to give reasons why they like or dislike something, describe experiences, and interpret meaning when they speak. These activities align with the overall communicative focus of meaningful learning and provide an opportunity for learners to build knowledge by engaging in real-world social communication instead of engaging in mere language exercises.

The last instructional unit, online shopping, is the most complex communicative context of the module as it combines the use of several linguistic functions that have been worked on in the preceding units. Learners are engaged in verbal exchanges of product descriptions, comparison of prices, online transactions, customer communication and purchasing decisions using vocabulary,

communicative expressions and interactional strategies learnt in previous lessons. This cumulative organization allows students to use the knowledge learned in the past to expand them into bigger communicative performances, which is the hierarchical organization of knowledge constructed by meaningful learning theory.

AI-Assisted Learning Integration

Adopting Artificial Intelligence (AI) as part of the proposed instructional design was not considered a technology factor, but rather a pedagogical factor. As opposed to AI being a single conversational medium, AI was intelligently deployed throughout the learning experience to enhance cognitive, communication, reflective learning in learners. This integration was to complement the meaningful learning framework that offers adaptive learning assistance at every phase of education to enable the students to continuously construct knowledge through interaction, practice and feedback.

The present instructional design, unlike many technology-enabled language learning environments where AI is featured only as a speaking partner or as an automated assessment system, sees AI as a scaffold for the language learning process, accompanying the learner from the activation of prior knowledge to reflection after learning. Thus, AI is not only helpful for language production, but also in cognitive organization, concept reinforcement, self-regulated learning and communicative confidence. This teaching posture makes AI a part of the teaching design instead of a standalone digital tool.

This integration starts at the Advanced Organizer (AO) phase in which the AI can help activate learners' prior knowledge before new instructional materials are presented. Students communicate with AI using prompts and scaffolding on topics from their past learning using the chosen urban living theme. Instead of introducing new words or grammatical forms, AI stimulates learners to associate with familiar situations, share their experiences and make their existing knowledge related to new words and grammatical forms. This type of interaction minimizes cognitive discontinuity between past experience and future learning, and at the same time, is also a preparation for further communicative tasks. AI, in this instructional context, functions as a dynamic organizer, which activates the knowledge on an individual basis based on each learner's background and responses.

During Progressive Differentiation (PD) phase, AI assists in developing the language knowledge step by step, reinforcing the use of vocabulary, practicing communicative expressions, dialogues, enhancing the pronunciation etc. Students are using AI to learn the new vocabulary through conversations, rather than by learning words in isolation. AI can provide feedback immediately on the lexical use, grammatical accuracy, sentence structure and pronunciation, as well as motivate the student to rephrase the response in a more suitable expression in the Arabic language. Such a back and forth communication enables learners to repeatedly differentiate between new constructs and the preexisting information structures, which is in compliance with the hierarchal type of learning proposed by Ausubel. AI does not replace classroom learning but innovates to a higher degree of language practice beyond the conventional learning process with limitless rehearsal and feedback possibilities on an individual basis.

The pedagogical value of AI in the Integrative Reconciliation Strategy is especially great as learners combine newly learned vocabulary, communicative expressions and speaking strategies with their previous knowledge and implement them in meaningful communication. It helps in sustained dialogue, problem solving work and comparison work, role-playing of a task, and other communication tasks, which necessitate that learners draw upon resources developed in earlier

learning tasks. These interactions would stimulate the learners to generate spontaneous replies and negotiate meaning and not use scripted dialogues only. Reflective interactions, where learners summarize what they have learnt, spot challenges, appraise their performance in speaking and are also given feedback on the areas where they are doing well or have areas to improve occur in the AI-supported activities. The prompting process guides the AI in detecting false or unsuitable language usage, make corrections and clarifications, estimate a score of performance on a scale of 110, with justification and recommend future improvement. Therefore, AI can be used as both a conversational learning partner but also reflectively as a kind of support that allows the learners to connect the newly acquired language to the more expansive communicative performance, enhance metacognitive awareness and make meaning of study.

There is also a distinct point about the proposed instructional design: prompted formats of the interaction with AI. For each instructional unit, there are well-designed prompts to help learners communicate with AI in a target language within a given communicative context and for specific learning goals. They do not offer learners freedom in the kind of discussions which can take place but give them specific guidelines on the communicative task, vocabulary emphasis, the communicative goals and feedback on communicative interactions. The given interaction, which includes prompts, reduces the cognitive load and helps to correspond the learning experiences, which the AI creates to the instructional aims. This means that, not only does AI not make decisions by itself as to what to do, but also, there is a distinct pedagogical structure established by the instructional design.

Discussion

The results indicate that one of the key considerations when incorporating AI into teaching Arabic speaking is the establishment of a pedagogical-based teaching design and not necessarily based on technology itself. The framework introduced in this paper unites meaningful learning theory, the contexts of real lives in urban places, AI-aided learning, and interactive digital content, as the components that are interrelated in the relations of design. In this paradigm, AI is framed as a scaffolding aid, which is meant to assist effective learning and not to supplant the pedagogical functions of a teacher. The proposed design proposal aligns with earlier research that has found the need to tie in new learning with the current knowledge frameworks by using well-organized learning experiences (Kong & Yang, 2024; Tapalova & Zhiyenbayeva, 2022; Wang & Li, 2026; Zou et al., 2025).

With the exception of previous works where AI has been assumed as a conversational, or an automated feedback system (Kibar & Ilgaz, 2026; Qian & Hassan, 2025; Weng et al., 2024), the framework suggests a broader role of AI in teaching and learning by placing the AI in another activity related to learning, as opposed to a single teaching activity in which the AI is involved. In the current design, AI is addressed to prior-knowledge-activation, guided-language-practice, reflective-speaking, self-directed learning, and each role corresponded to the three meaningful learning strategies and to the learning objectives. It is an expansion of the design where AI is considered as a part of the instructional process instead of a technological option. Nevertheless, the design is limited by the context in accordance with which it has been created, i.e. the beginners level of teaching of Arabic speaking and interaction scenarios within the environment of living in a city. Other designs might put AI in a conversational practice, feedback, or independent learning only condition; the current structure suggests that process integration be applied throughout the instructional sequence, to not disrupt pedagogical flow. Its applicability to other levels, settings, or language competencies, would thus necessitate contextualized adoptions of the learning objectives, learning content,

communicative scenarios as well as an eliciting framework. Since the current research is focused on the analysis and exploration and design and construction processes, the contribution is not to be interpreted as implying the only high level of efficacy among the various approaches compared to what previous researchers reported.

The other contribution of this research is that learning content is organised in real-life urban living situations. The contexts enable the learners to link the Arabic speaking situations with real life and hence render them meaningful and relevant. It is in line with the theories (Abah & Vilakazi, 2026; Jaramillo, 2021; Jaramillo Cherrez & Nadolny, 2023; Dhahi et al., 2025). Furthermore, the inclusion of multimedia content, embedded pronunciation, teaching video, QR-codes, AI-assisted activities, and interactive speaking tasks deliver a multimodal learning experience, which facilitates involvement and continuous language practice.

In terms of instructional design, this study suggests a model that combines meaningful learning, AI-assisted learning, authentic contexts, and interactive module design of the digital module into a single model of teaching Arabic speaking. It is supported by previous researches (Andayanie et al., 2025; Gusma et al., 2025; Nurhasanah et al., 2022; Qureshi et al., 2022). The framework provides concrete advice to teachers and education designers who want to use AI in language learning without compromising good pedagogical practices. This study, however, was confined to the analysis and design stages of the research and development model, so that future study should be extended to the development, implementation and evaluation stages in order to validate and test the effectiveness of the instructional design proposed in this study.

Conclusion

This study developed a pedagogically informed instructional design framework for an AI-assisted interactive digital module for Arabic speaking instruction in an urban living context. The analysis and exploration process identified several interconnected instructional needs, including limited opportunities for speaking practice, difficulties with vocabulary, pronunciation, and oral expression, the need for contextualized communication situations, and limited opportunities for independent practice. These findings were triangulated across preliminary questionnaire data, classroom observations, semi-structured interviews, and instructional document analysis. Based on these empirical and contextual requirements, the design and construction process translated the identified needs into a proposed instructional framework integrating meaningful learning, AI-assisted learning, authentic urban living contexts, and interactive digital learning. The framework operationalizes three complementary instructional strategies—advanced organizer, progressive differentiation, and integrative reconciliation—and positions AI as a structured learning support for speaking practice, feedback, reflection, and independent learning. Thus, the principal contribution of the study is a theoretically grounded and empirically informed instructional design that provides a basis for developing AI-assisted Arabic speaking learning environments.

The research results would need to be understood in the projects of the research. The study was performed under one institutional setting and targeted the analysis and exploration and design and construction processes; consequently, the suggested framework is yet to be proven by implementation or outcome assessment. It might be necessary to adapt it to other levels of proficiency, other institutions, or other learning contexts or language competencies. The research process (the second step) shall consist of expert review and refinement of the design, implementation and evaluation to test its pedagogical viability, usability, and its potential role in the development of

the Arabic speaking. In this regard, the current structure must be taken as a design argument that offers a base of further validation and empirical study as opposed to indications of an instructional efficiency.

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