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Metacognitive Strategies and Arabic Vocabulary Acquisition Through Listening Skills: Insights for AI-Assisted Language Learning

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Abstract

Vocabulary acquisition is a fundamental aspect of Arabic language learning, particularly in listening activities (*maharah al-istima'*). This study explores the metacognitive strategies employed by students in acquiring Arabic vocabulary through listening skills and identifies the most dominant strategy used during the process. Using a descriptive qualitative approach, data were collected from students of the Arabic Language Education Program at the State Islamic University of Palangka Raya through observation, in-depth interviews, and documentation. The data were analyzed using the interactive model of Miles, Huberman, and Saldaña. The findings revealed that students employed three metacognitive strategies: planning, monitoring, and evaluating. During planning, students prepared their focus and learning resources. During monitoring, they took notes on unfamiliar vocabulary, replayed audio, inferred meanings from context, and sought assistance when needed. During evaluating, they reviewed notes, consulted dictionaries, discussed with peers, and replayed audio to confirm understanding. Monitoring emerged as the most dominant strategy. The findings indicate that metacognitive strategies support more systematic and autonomous vocabulary acquisition and provide implications for the development of AI-assisted Arabic language learning environments.

Keywords: *Metacognitive Strategies; Arabic Vocabulary Acquisition; Listening Skills; Self-Regulated Learning; AI-Assisted Language Learning*

Abstrak

Pemerolehan kosakata merupakan aspek penting dalam pembelajaran bahasa Arab, khususnya pada keterampilan menyimak (*maharah al-istimā*). Penelitian ini bertujuan mengeksplorasi strategi metakognitif yang digunakan mahasiswa dalam memperoleh kosakata bahasa Arab melalui kegiatan menyimak serta mengidentifikasi strategi yang paling dominan digunakan. Penelitian menggunakan pendekatan kualitatif deskriptif dengan subjek mahasiswa Program Studi Pendidikan Bahasa Arab UIN Palangka Raya. Data diperoleh melalui observasi, wawancara mendalam, dan dokumentasi, kemudian dianalisis menggunakan model Miles, Huberman, dan Saldaña. Hasil penelitian menunjukkan bahwa mahasiswa menerapkan tiga strategi metakognitif, yaitu *planning*, *monitoring*, dan *evaluating*. Pada tahap *planning*, mahasiswa mempersiapkan fokus dan sumber belajar. Pada tahap *monitoring*, mahasiswa mencatat kosakata baru, mengulang audio, menafsirkan makna berdasarkan konteks, dan mencari bantuan ketika mengalami kesulitan. Pada tahap *evaluating*, mahasiswa meninjau ulang catatan, membuka kamus, berdiskusi, dan mengulang audio untuk memastikan pemahaman. Strategi *monitoring* ditemukan sebagai strategi yang paling dominan. Temuan ini menunjukkan bahwa strategi metakognitif mendukung pemerolehan kosakata yang lebih sistematis dan mandiri serta memberikan implikasi bagi pengembangan pembelajaran bahasa Arab berbantuan kecerdasan buatan (AI).

Kata Kunci: *Strategi Metakognitif; Pemerolehan Kosakata Bahasa Arab; Keterampilan Menyimak; Self-Regulated Learning; Pembelajaran Bahasa Berbantuan AI*

Introduction

Listening skill (*maharah al-istimā*) is a fundamental component of Arabic language learning, as it serves as the primary gateway to language acquisition.¹ Naturally, individuals acquire language through listening before developing the ability to speak, read, or write. In the context of Arabic language education, listening functions not only as a means of receiving information but also as a medium for recognizing linguistic sounds, understanding language structures, and acquiring new vocabulary used in various communicative contexts.² Oleh karena itu, kemampuan menyimak memiliki peran yang sangat. Therefore, listening

¹ Xiangying Jiang. *Developing Reading and Listening Proficiency with Duolingo: A Cross-Sectional Analysis*. Pittsburgh, 2022.

² Yeni Ghonivita, John Pahamzah, Syafrizal Syafrizal, and Murti Ayu Wijayanti. "Improving Students' Listening Skill and Vocabulary Mastery through Contextual Teaching and Learning (CTL) By Using Online Learning for Senior High School." *International Journal of English Language and Linguistics Research* 9, no. 4 (2021): 45–56.

proficiency plays a crucial role in enabling students to develop a comprehensive understanding of linguistic elements.

Vocabulary is one of the key determinants of success in learning Arabic. Adequate vocabulary knowledge enables students to comprehend messages, interpret meanings accurately, and use the language effectively in different communicative situations.³ Conversely, limited vocabulary often constitutes a major obstacle to understanding spoken materials, even when learners possess sufficient grammatical knowledge. During listening activities, students are required not only to recognize familiar words but also to identify new vocabulary, infer meanings from context, and connect new lexical items with their prior knowledge. Consequently, vocabulary acquisition through listening is a complex process that requires active learner engagement.⁴

The success of vocabulary acquisition through listening is influenced not only by the quality of linguistic input but also by learners' ability to consciously regulate their learning processes. This ability is referred to as metacognition, which encompasses individuals' awareness of their own thinking processes and their capacity to control those processes in order to achieve specific learning goals.⁵ In language learning, metacognitive strategies help learners plan learning activities, monitor comprehension during learning, and evaluate learning outcomes. O'Malley and Chamot classify metacognitive strategies into three major components: planning, monitoring, and evaluating. These strategies enable learners to become more active, reflective, and autonomous in managing their learning experiences.⁶

³ Wen, Xin. "The Effect of Gamification Learning on Primary School Students' Second Language Learning." *Journal of Education, Humanities and Social Sciences* 22 (November 2023): 492–501. <https://doi.org/10.54097/ehss.v22i.12510>.

⁴ Raj Sharma, Lok. "Exploring the Landscape of Challenges and Opportunities in Teaching Speaking Skills." *International Journal of Advanced Multidisciplinary Research and Studies* 4, no. 3 (May 2024): 74–78. <https://doi.org/10.62225/2583049X.2024.4.3.2745>.

⁵ Hamzah, Hainora, Mohd Isa Hamzah, and Hafizhah Zulkifli. "Systematic Literature Review on the Elements of Metacognition-Based Higher Order Thinking Skills (HOTS) Teaching and Learning Modules." *Sustainability* 14, no. 2 (January 2022): 813. <https://doi.org/10.3390/su14020813>.

⁶ Chamot, Anna Uhl, and J. Michael O'Malley. "The Cognitive Academic Language Learning Approach: A Model for Linguistically Diverse Classrooms." *The Elementary School Journal* 96, no. 3 (January 1996): 259–73. <https://doi.org/10.1086/461827>.

Research on metacognitive strategies has consistently demonstrated their significant contribution to second language acquisition. Al-Alwan, Asassfeh, and Al-Shboul found that metacognitive awareness is positively associated with listening comprehension among English as a Foreign Language (EFL) learners, particularly in terms of planning, monitoring, and evaluating comprehension during listening activities.⁷ Their findings indicate that learners with higher levels of metacognitive awareness tend to achieve better comprehension outcomes than those with lower levels. Similarly, Wallace reported that metacognition remains a significant predictor of second-language listening performance even after controlling for the effect of vocabulary knowledge.⁸ Meanwhile, Bozorgian et al. revealed that metacognitive interventions integrated with out-of-class listening activities help learners identify difficulties, enhance learning awareness, and improve listening comprehension. Collectively, these studies highlight the critical role of metacognitive strategies in facilitating more effective language comprehension processes.⁹

More recent studies suggest that the relevance of metacognitive strategies has become increasingly prominent in technology-enhanced and AI-supported language learning environments. Peng, Rashid, and Jiang found that integrating metacognitive strategy instruction within a Mobile-Assisted Language Learning (MALL) environment significantly improved EFL learners' metacognitive awareness and listening skills.¹⁰ Likewise, Su reported that metacognitive awareness plays a vital role in reducing listening anxiety and enhancing listening comprehension

⁷ Al-Alwan, Ahmed, Sahail Asassfeh, and Yousef Al-Shboul. "EFL Learners' Listening Comprehension and Awareness of Metacognitive Strategies: How Are They Related?" *International Education Studies* 6, no. 9 (August 2013). <https://doi.org/10.5539/ies.v6n9p31>.

⁸ Wallace, Matthew P. "Exploring the Relationship Between L2 Listening and Metacognition after Controlling for Vocabulary Knowledge." *Journal of Language and Education* 7, no. 3 (September 2021): 187–200. <https://doi.org/10.17323/jle.2021.12685>.

⁹ Bozorgian, Hossein, Meysam Muhammadpour, and Elahe Mahmoudi. "Embedding L2 Listening Homework in Metacognitive Intervention: Listening Comprehension Development." *Frontiers in Education* 7 (June 2022). <https://doi.org/10.3389/educ.2022.819308>.

¹⁰ Peng, Changhong, Sabariah Md Rashid, and Liping Jiang. "The Use of Metacognitive Strategies within a Mobile-Assisted Language Learning Context: Enhancing Chinese EFL Learner's Listening Skills." *Forum for Linguistic Studies* 6, no. 6 (December 2024): 410–28. <https://doi.org/10.30564/fls.v6i6.7439>.

performance among foreign language learners.¹¹ Despite the growing body of research on the relationship between metacognitive strategies and listening skills in second-language learning, most studies have focused on English language contexts. Research specifically examining how metacognitive strategies are employed in Arabic vocabulary acquisition through listening remains limited. Furthermore, studies exploring the implications of metacognitive findings for the development of AI-assisted Arabic language learning environments are still scarce. These gaps provide the primary rationale for the present study.

Based on these considerations, this study aims to explore the metacognitive strategies employed by students in acquiring Arabic vocabulary through listening skills (*maharah al-istimā'*). Specifically, it seeks to identify how students implement planning, monitoring, and evaluating strategies during the vocabulary acquisition process and to determine which strategy is most dominant in facilitating vocabulary comprehension during listening activities. In addition to contributing to the growing body of research on metacognition in Arabic language learning, this study offers pedagogical implications for the development of AI-assisted Arabic learning environments capable of supporting learners' planning, monitoring, and evaluation processes more effectively. Accordingly, the findings are expected to provide both theoretical and practical contributions to the advancement of Arabic language education in the era of artificial intelligence.

Method

This study employed a qualitative descriptive approach. This approach was selected because the study focused on an in-depth exploration of the metacognitive strategies used by students in acquiring Arabic vocabulary through listening skills (*maharah al-istimā'*). A qualitative approach enabled the researchers to gain a comprehensive understanding of students' learning experiences, thought processes, and strategic behaviors during listening activities. Furthermore, it was considered appropriate for examining how students plan, monitor, and

¹¹ Su, Huina. "An Exploration of the Role of Metacognitive Awareness and Listening Anxiety in EFL Learners' Listening Comprehension." *International Journal of Listening* 39, no. 2 (May 2025): 150–62. <https://doi.org/10.1080/10904018.2024.2420103>.

evaluate their learning processes within the metacognitive framework proposed by O'Malley and Chamot.¹²

The participants of this study were 29 students enrolled in the Arabic Language Education Program at the State Islamic University of Palangka Raya who were taking the *al-Istimā' an-Naqdy* course. Among them, eight students were selected as key informants through purposive sampling. The selection was based on their level of participation in learning activities and their ability to provide information relevant to the research focus. This technique was employed to obtain rich and in-depth data regarding the metacognitive strategies students used during the process of vocabulary acquisition through listening activities.

The study utilized both primary and secondary data sources. Primary data were collected through classroom observations, in-depth interviews, and documentation. Observations were conducted during learning activities to identify students' learning behaviors while engaging in listening tasks. In-depth interviews were used to explore students' learning experiences, metacognitive awareness, and the strategies they employed before, during, and after listening activities. Documentation, including students' notes, assignments, and other supporting materials, was used to complement and validate the findings obtained from observations and interviews. Secondary data were gathered from scholarly literature related to metacognitive strategies, vocabulary acquisition, listening skills, and technology-enhanced language learning.

Data were analyzed using the interactive model developed by Miles, Huberman, and Saldaña, which consists of three stages: data condensation, data display, and conclusion drawing and verification.¹³ During the data condensation stage, observation notes, interview transcripts, and documentation were selected, categorized, and focused according to the objectives of the study. The data were then systematically displayed to facilitate the identification of emerging metacognitive strategy patterns. Finally, conclusions were drawn and verified by examining relationships among the collected data, resulting

¹² Chamot, Anna Uhl, and J. Michael O'Malley: 259–73. <https://doi.org/10.1086/461827>.

¹³ Matthew B. Miles, A. Michael Huberman, and Johnny Saldaña. *Qualitative Data Analysis: A Methods Sourcebook*. 3rd ed. Thousand Oaks, CA: SAGE Publications, 2014.

in a comprehensive understanding of students' metacognitive strategies in acquiring Arabic vocabulary through listening activities.

To guide the analysis, the data were classified according to O'Malley and Chamot's metacognitive strategy framework, which comprises three main categories: planning, monitoring, and evaluating. The planning category included preparatory activities undertaken before listening tasks. Monitoring referred to students' efforts to oversee and regulate their comprehension during listening activities. Evaluating encompassed reflective and assessment-oriented activities conducted after listening tasks had been completed. This classification was used to identify the most dominant strategy patterns and to explain their contributions to Arabic vocabulary acquisition.

The trustworthiness of the data was ensured through source triangulation and methodological triangulation. Source triangulation was conducted by comparing information obtained from different informants, while methodological triangulation involved comparing findings from observations, interviews, and documentation. These procedures enhanced the credibility and reliability of the research findings.

This study did not involve Artificial Intelligence (AI) as either a research variable or an object of investigation. The discussion of AI was positioned at a conceptual level as part of the broader context of contemporary language learning developments. Therefore, the metacognitive framework employed in this study may serve as a reference for identifying planning, monitoring, and evaluating processes that could potentially be integrated into the design of AI-assisted Arabic language learning platforms and instructional media in future research.

Results and Discussion

The findings revealed that students of the Arabic Language Education Program at the State Islamic University of Palangka Raya consciously employed various metacognitive strategies to acquire Arabic vocabulary through listening activities (*maharah al-istimā'*). Based on observations, in-depth interviews, and document analysis, these strategies were found to occur sequentially before, during, and after listening activities. In general, the strategies could be classified into three major processes proposed by O'Malley and Chamot: planning, monitoring, and evaluating. These interconnected strategies formed a learning cycle that enabled students to acquire new vocabulary in a more systematic and purposeful manner.

Before listening activities began, most students demonstrated efforts to prepare themselves to engage effectively with the learning materials. Their preparation involved not only technical aspects, such as preparing notebooks and writing tools, but also mental readiness through focusing attention and enhancing concentration. Students recognized that successful comprehension of the audio content largely depended on their preparedness to receive and process incoming information. Several informants reported that they attempted to eliminate distractions that could reduce their concentration before the audio was played. Some students also recalled previously learned materials or vocabulary to facilitate comprehension of the upcoming listening task. These findings indicate that students did not approach listening activities spontaneously; rather, they engaged in deliberate preparation, reflecting an awareness of the importance of regulating the learning process from the outset.

During listening activities, students employed a variety of monitoring strategies to regulate their comprehension. The most frequently reported strategy was taking notes on unfamiliar vocabulary. When encountering unknown words or expressions, students tended to write them down for further examination after the listening activity had ended. This note-taking practice helped them retain information while facilitating subsequent meaning exploration. In addition to recording unfamiliar vocabulary, students frequently replayed audio recordings to gain a clearer understanding of pronunciation and meaning. Audio repetition was particularly common when students felt that they had missed important information or experienced difficulty keeping pace with the speaker's delivery.

The findings also showed that students relied on contextual clues to infer the meanings of unfamiliar vocabulary. Rather than immediately consulting a dictionary, many students attempted to establish connections between unknown words and previously understood vocabulary or contextual information within the audio. This strategy enabled them to construct tentative meanings independently based on the available context. Furthermore, when difficulties could not be resolved independently, students sought assistance from peers or instructors to confirm their understanding. Such behaviors indicate that students actively monitored their comprehension and worked to maintain effective engagement with listening tasks despite various challenges.

Compared with other strategies, monitoring emerged as the most dominant metacognitive strategy. Nearly all informants reported activities such as note-taking, replaying audio, inferring meanings from

context, and seeking assistance as integral components of their efforts to understand spoken materials. The predominance of monitoring suggests that students possessed a relatively high level of awareness regarding their ongoing learning processes. They were not merely passive recipients of information; rather, they actively regulated, examined, and refined their understanding throughout the listening activity. These findings indicate that vocabulary acquisition through listening is strongly influenced by learners' ability to continuously monitor and regulate their comprehension.

After listening activities were completed, students engaged in several evaluative practices to verify the accuracy of their understanding of newly acquired vocabulary. The most common activity was reviewing the notes they had taken during the listening process. Through this practice, students revisited newly encountered vocabulary while identifying areas that remained unclear. In addition, students frequently consulted dictionaries to verify meanings that had initially been inferred from contextual clues. Dictionary use functioned as a confirmation tool, enabling students to develop a more accurate understanding of the vocabulary they had encountered.

Some students also discussed the audio content and difficult vocabulary items with their peers. These discussions provided additional perspectives and reduced the likelihood of misinterpretation. Moreover, several students reported listening to the audio again after class as a means of evaluating their comprehension. By revisiting the audio, they were able to compare their level of understanding before and after exploring the meanings of unfamiliar vocabulary. These activities reflect a deliberate effort to assess learning outcomes and reinforce vocabulary mastery acquired through listening.

Overall, the findings indicate that Arabic vocabulary acquisition through listening occurs through a series of interconnected metacognitive activities. Students began the learning process by preparing their attention and learning resources, actively monitored their comprehension through note-taking, audio repetition, contextual inference, and help-seeking behaviors, and subsequently evaluated their understanding through note review, dictionary consultation, peer discussion, and repeated listening. These findings demonstrate that metacognitive strategies not only facilitate more effective vocabulary acquisition but also promote greater learner autonomy and reflective learning practices.

The identified strategy patterns also provide insights into learning processes that may be supported by AI-assisted learning systems. Activities such as recording unfamiliar vocabulary, replaying audio, inferring meaning from context, and evaluating comprehension through feedback could serve as foundations for the development of intelligent features within Arabic language learning platforms. Therefore, the findings not only explain students' metacognitive behaviors in acquiring vocabulary through listening but also offer a conceptual basis for the development of more adaptive and learner-centered Arabic language learning environments in the era of artificial intelligence.

Discussion

The findings indicate that Arabic vocabulary acquisition through listening is not an automatic process resulting solely from language exposure; rather, it involves conscious self-regulation through the use of metacognitive strategies. Students function not merely as recipients of information but as active learners who manage their learning processes through planning, monitoring, and evaluating activities. These findings support O'Malley and Chamot's view that successful language learning is strongly influenced by learners' ability to regulate their own cognitive processes. In this study, metacognitive strategies served as mechanisms that enabled students to organize attention, identify learning difficulties, and develop appropriate approaches to understanding and acquiring new vocabulary through listening activities.¹⁴

The presence of planning, monitoring, and evaluating strategies across all participants suggests that vocabulary acquisition through listening represents a form of self-regulated learning. Before listening, students prepared their focus and learning resources. During listening, they actively monitored comprehension by taking notes on unfamiliar vocabulary, replaying audio recordings, inferring meanings from context, and seeking assistance when necessary. After listening, they engaged in reflection through reviewing notes, consulting dictionaries, discussing with peers, and replaying audio materials to verify their understanding. This pattern demonstrates that vocabulary acquisition

¹⁴ Peng, Changhong, Weixing Gu, and Liping Jiang. "Effects of Mobile-Assisted Language Learning (MALL)-Delivered Explicit Metacognitive Intervention on Chinese EFL Students' Receptive Skills and Metacognitive Awareness." *Journal of Computer Assisted Learning* 41, no. 5 (October 2025). <https://doi.org/10.1111/jcal.70125>.

depends not only on linguistic input but also on learners' ability to consciously and continuously regulate their learning processes.¹⁵

Among the identified strategies, monitoring emerged as the most dominant. This finding suggests that students' primary concern during listening was not passive reception of information but the active regulation of comprehension. Activities such as note-taking, replaying audio, identifying unclear sections, and seeking clarification from peers or instructors reflect a high level of learning awareness.¹⁶ The dominance of monitoring indicates that students perceive listening as an active meaning-making process rather than merely hearing linguistic sounds.¹⁷

This finding is consistent with previous studies that identify monitoring as a central component of metacognitive language learning strategies. Kessler emphasized that the ability to monitor comprehension during listening is closely associated with successful understanding of spoken information.¹⁸ Likewise, Tekir reported that monitoring activities help learners identify comprehension barriers and implement appropriate corrective actions.¹⁹ In the context of Arabic language learning, the present findings suggest that monitoring functions as a bridge between auditory input and vocabulary acquisition. In other words, students acquire vocabulary not simply because they hear new words, but because

¹⁵ Wan Afiqah Anis Wan Ahmad, Mohamad Azrien Mohamed Adnan, Wan Rohani Wan Mokhtar, and Suryani Awang. "Breaking Language Barriers: How E-Learning Enhances Metacognitive Awareness and Self-Efficacy in Foreign Language Acquisition." *Journal of Advanced Research in Applied Sciences and Engineering Technology* 44, no. 1 (April 2024): 69–76. <https://doi.org/10.37934/araset.44.1.6976>.

¹⁶ Teng, Mark Feng, and Junjie Gavin Wu. "An Investigation of Learners' Perceived Progress During Online Education: Do Self-Efficacy Belief, Language Learning Motivation, and Metacognitive Strategies Matter?" *The Asia-Pacific Education Researcher* 33, no. 2 (April 2024): 283–95. <https://doi.org/10.1007/s40299-023-00727-z>.

¹⁷ Nanda Siska Safitri, Mohammad Rofiqi, Muhajir, Bobby Bagas Purnama, and Shosita Manrova. "TOAFL.Com: A CEFR-Based Simulation Platform for Learning Al-Arabiyah Lil Akadimiyah Among Indonesian Students." *Alibbaa': Jurnal Pendidikan Bahasa Arab* 6, no. 1 (January 2025): 1–22. <https://doi.org/10.19105/ajpba.v6i1.17201>.

¹⁸ Kessler, Matt. "Supplementing Mobile-Assisted Language Learning with Reflective Journal Writing: A Case Study of Duolingo Users' Metacognitive Awareness." *Computer Assisted Language Learning* 36, nos. 5–6 (July 2023): 1040–63. <https://doi.org/10.1080/09588221.2021.1968914>.

¹⁹ Tekir, Serpil. "Generative AI Use in EFL Writing: Associations with Originality, Critical Reasoning, and Metacognitive Engagement in a Turkish Higher Education Context." *Computer Assisted Language Learning*, January 20, 2026, 1–22. <https://doi.org/10.1080/09588221.2026.2617399>.

they actively observe, evaluate, and adjust their understanding throughout the listening process.²⁰

Furthermore, the findings demonstrate that vocabulary acquisition through listening is a complex process of meaning construction. When encountering unfamiliar vocabulary, students did not immediately consult dictionaries. Instead, they attempted to infer meanings from sentence context, topic familiarity, and connections with previously acquired vocabulary. This finding indicates that vocabulary learning is not merely a mechanical process of memorization but an interpretive activity involving prior knowledge, linguistic context, and metacognitive reflection.²¹ Consequently, vocabulary acquired through listening can be understood as the result of active meaning negotiation undertaken by learners.

From a broader perspective, these findings become increasingly relevant within the context of AI-assisted language learning. Although this study did not directly investigate the use of Artificial Intelligence (AI), the identified metacognitive patterns provide valuable insights into how AI technologies should be designed to support language learning. Current AI developments in education often emphasize automation, such as content delivery, automated assessment, and instant information provision. However, the findings suggest that successful learning depends not only on information availability but also on learners' ability to regulate their own learning processes.²² Therefore, effective AI systems should be designed to support learners' metacognitive activities.

At the planning stage, students demonstrated the need to establish focus, concentration, and learning readiness before listening activities. This finding suggests that AI-assisted learning systems could support preparation through adaptive pre-listening activities, vocabulary

²⁰ Baharudin, Harun, and Nur Farahhuda Abdul Rahman. "The Impact of Metacognitive Awareness on Arabic Listening Proficiency among Religious Secondary School Students." *The Open Psychology Journal* 18, no. 1 (October 2025). <https://doi.org/10.2174/0118743501422272251006211402>.

²¹ Robillos, Roderick Julian. "Exploring Translanguaging during Metacognitive Strategy Use on L2 Listening and Writing Skills." *Journal of Language and Education* 9, no. 3 (September 2023): 110–28. <https://doi.org/10.17323/jle.2023.14329>.

²² Taherkhani, Bahador, Seyed Hesamuddin Aliasin, Robab Khosravi, and Siros Izadpanah. "The Interface Between Metacognitive Strategy Training and Locus of Control in Developing EFL Learners' Listening Comprehension Skill." *Frontiers in Education* 7 (July 2022). <https://doi.org/10.3389/educ.2022.847564>.

previews, learner profiling, and personalized learning pathways.²³ In this way, AI would function not merely as a content provider but also as a facilitator of cognitive readiness.

The potential role of AI becomes even more significant during the monitoring stage. Students' repeated use of audio replay, vocabulary note-taking, and help-seeking behaviors indicates a need for responsive and context-sensitive support. AI-assisted learning environments could address these needs through automatic transcription, adaptive subtitles, real-time identification of difficult vocabulary, contextual explanations, and intelligent feedback systems.²⁴ These findings suggest that AI should not replace learners' monitoring processes but rather strengthen and accelerate them, enabling learners to focus more effectively on meaning construction and comprehension.²⁵

A similar pattern applies to the evaluating stage. Students evaluated their learning through note review, dictionary consultation, discussion, and repeated listening. These activities reflect a need to verify understanding and assess learning outcomes. Within AI-assisted learning environments, such evaluation processes could be enhanced through automated feedback, adaptive quizzes, learning analytics, and personalized recommendations.²⁶ Consequently, AI may serve as a learning partner that facilitates systematic reflection on both learning processes and outcomes.

Overall, this study proposes that the relationship between metacognitive strategies and AI should be viewed as complementary

²³ Zaimah, Nely Rahmawati, Risti Kamila Wening Estu, Syarifatul Fitri Hidayah, Syamsul Hadi, and Aiden Button. "Harnessing Gemini for Arabic Mastery: Educators' and Learners' Views." *Alibbaa': Jurnal Pendidikan Bahasa Arab* 5, no. 2 (July 2024): 166–88. <https://doi.org/10.19105/ajpba.v5i2.14808>.

²⁴ Wang, Yiyin, Tiancheng Zhang, Le Yao, and Paul Seedhouse. "A Scoping Review of Empirical Studies on Generative Artificial Intelligence in Language Education." *Innovation in Language Learning and Teaching*, June 5, 2025, 1–28. <https://doi.org/10.1080/17501229.2025.2509759>.

²⁵ Achruh, Achruh, Muhammad Rapi, Muhammad Rusdi, and Ridwan Idris. "Challenges and Opportunities of Artificial Intelligence Adoption in Islamic Education in Indonesian Higher Education Institutions." *International Journal of Learning, Teaching and Educational Research* 23, no. 11 (November 2024): 423–43. <https://doi.org/10.26803/ijlter.23.11.22>.

²⁶ König, Caroline, Pedro Copado, Alfredo Vellido, Àngela Nebot, Cecilio Angulo, Maria Lamarca, Vanessa Acuña, et al. "An Artificial Intelligence-Based Platform for Personalized Predictions of Metacognitive Training Effectiveness." *Computational and Structural Biotechnology Journal* 28 (January 2025): 281–93. <https://doi.org/10.1016/j.csbj.2025.07.051>.

rather than substitutive. Artificial intelligence cannot replace learners' metacognitive awareness; however, it can be designed to strengthen planning, monitoring, and evaluating processes that form the foundation of self-regulated language learning. Therefore, the effectiveness of AI-assisted Arabic language learning depends not only on technological sophistication but also on the extent to which AI supports learners' metacognitive engagement during vocabulary acquisition through listening. This perspective opens opportunities for the development of AI-enhanced Arabic language learning models that emphasize not only instructional automation but also learner autonomy and self-regulation.

Conclusion

This study found that students of the Arabic Language Education Program at the State Islamic University of Palangka Raya consciously employed metacognitive strategies in acquiring Arabic vocabulary through listening activities (*maharah al-istimā'*). These strategies consisted of planning, monitoring, and evaluating, as conceptualized by O'Malley and Chamot. During the planning stage, students prepared their focus, concentration, and learning resources. During monitoring, they actively regulated comprehension through note-taking, audio repetition, contextual inference, and help-seeking behaviors. During evaluating, they reflected on learning outcomes through reviewing notes, consulting dictionaries, discussing with peers, and replaying audio materials. Among these strategies, monitoring emerged as the most dominant. The findings confirm that successful vocabulary acquisition is influenced not only by language exposure but also by learners' ability to consciously regulate their learning processes.

Theoretically, this study contributes to the growing body of research on metacognitive strategies in Arabic language learning, particularly in the relatively underexplored area of vocabulary acquisition through listening. Practically, the findings offer implications for the development of AI-assisted Arabic learning environments that support learners' planning, monitoring, and evaluating processes rather than focusing solely on instructional automation. Nevertheless, the study is limited by its focus on a single academic program and a relatively small number of participants, and it did not directly investigate AI implementation in learning contexts. Future studies are therefore encouraged to involve more diverse participants, employ mixed-methods designs, and explore how AI features such as automated feedback, intelligent transcription, and adaptive learning systems can support learners' metacognitive strategies in Arabic vocabulary acquisition through listening activities.

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