



CONTINUING EDUCATION IN THE AGE OF ARTIFICIAL INTELLIGENCE IN ARABIC

EDUCACIÓN CONTINUA EN LA ERA DE LA INTELIGENCIA ARTIFICIAL EN ÁRABE

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ABSTRACT:

The integration of Information and Communication Technologies (ICT) and artificial intelligence (AI) in Arabic language education has become critical in contemporary pedagogical contexts. The proliferation of social media platforms and AI-powered tools, particularly ChatGPT, has transformed traditional language acquisition methodologies, enabling learners to develop the four fundamental language competencies—reading, writing, speaking, and listening—through technologically mediated environments. However, despite the widespread adoption of digital platforms in foreign language instruction, Arabic language education faces unique challenges that remain insufficiently addressed in existing scholarship. This study examines the AI integration within continuing education contexts for Arabic speakers, focusing on the convergence of technical challenges, socioeconomic imperatives, ethical considerations, and cultural dimensions. While social media and AI technologies offer unprecedented opportunities for distance learning and autonomous language acquisition, significant barriers persist, including limited culturally responsive AI systems, inadequate digital literacy among Arabic-speaking populations, and the scarcity of pedagogically sound, technology-enhanced Arabic curricula. We identified both existing obstacles and latent opportunities for developing more inclusive, effective, and culturally relevant educational ecosystems. Based on that, we emphasize the necessity of creating original, adaptable strategies that align with current technological developments while respecting Arabic linguistic and cultural specificities. We aim to contribute to the emerging discourse on AI-assisted language education by proposing frameworks for integrating advanced technologies into Arabic instruction, thereby addressing the digital age's educational demands and establishing

pathways toward more equitable and sustainable Arabic language learning environments in the era of artificial intelligence.

Keywords: Arabic language, Foreign language learning, Arabic teaching, Online learning, Artificial intelligence, Continuing education, ICT integration.

RESUMEN:

La integración de las Tecnologías de la Información y la Comunicación (TIC) y la inteligencia artificial (IA) en la enseñanza del árabe se ha vuelto crucial en los contextos pedagógicos contemporáneos. La proliferación de plataformas de redes sociales y herramientas basadas en IA, en particular ChatGPT, ha transformado las metodologías tradicionales de adquisición de idiomas, permitiendo a los estudiantes desarrollar las cuatro competencias lingüísticas fundamentales (lectura, escritura, expresión oral y comprensión auditiva) a través de entornos mediados por la tecnología. Sin embargo, a pesar de la adopción generalizada de plataformas digitales en la enseñanza de lenguas extranjeras, la educación del árabe se enfrenta a desafíos únicos que aún no se han abordado adecuadamente en la investigación existente. Este estudio examina la integración de la IA en contextos de formación continua para hablantes de árabe, centrándose en la convergencia de desafíos técnicos, imperativos socioeconómicos, consideraciones éticas y dimensiones culturales. Si bien las redes sociales y las tecnologías de IA ofrecen oportunidades sin precedentes para el aprendizaje a distancia y la adquisición autónoma de idiomas, persisten importantes barreras, como la limitada capacidad de respuesta cultural de los sistemas de IA, la insuficiente alfabetización digital entre las poblaciones de habla árabe y la escasez de currículos de árabe pedagógicamente sólidos y con



tecnología avanzada. Se identifica tanto los obstáculos existentes, como las oportunidades latentes para desarrollar ecosistemas educativos más inclusivos, eficaces y culturalmente relevantes. En base a esto, se enfatiza la necesidad de crear estrategias originales y adaptables que se alineen con los avances tecnológicos actuales, respetando al mismo tiempo las especificidades lingüísticas y culturales del árabe. El objetivo es contribuir al debate emergente sobre la educación lingüística asistida por IA, proponiendo marcos para integrar tecnologías avanzadas en la enseñanza del árabe, abordando así las demandas educativas de la era digital y estableciendo vías hacia entornos de aprendizaje del árabe más equitativos y sostenibles en la era de la inteligencia artificial.

Palabras clave: Lengua árabe, Aprendizaje de lenguas extranjeras, Enseñanza del árabe, Aprendizaje en línea, Inteligencia artificial, Formación continua, Integración de las TIC.

INTRODUCTION

Artificial intelligence (AI) is one of the ever-evolving technologies used in recent years to personalize the experiences of various learning groups, students, and instructors. Artificial intelligence is considered to be one of the most requested technologies in education systems worldwide, especially in terms of integrating data according to the needs of the target group, helping to create personalized learning experiences by processing data, developing intelligent content, expanding the scope of education, and facilitating it. Artificial intelligence has begun to become one of the important tools for educators in identifying students' learning styles and pain points and providing new ways of teaching and supporting students. It has great potential to help students achieve their goals and facilitate the learning process. Moreover, it is capable of examining students' prior learning trajectories, detecting areas where they struggle, and using this information to enhance and tailor future learning opportunities to support personalized educational experiences (Strielkowski et al., 2025; Walter, 2024).

Today, artificial intelligence represents an emerging technology that will bring great improvements to most areas of our lives and change the way people live. The first artificial intelligence system, called "Logic Theorist," was designed by Allen Newell and Herbert A. Simon in 1955, and the system was implemented by J. Clifford Shaw. The term artificial intelligence was first used by John McCarthy in 1956 (Giusti, 2025). Various researchers have defined the term artificial intelligence as "computers capable of performing cognitive tasks normally associated with the human mind." Furthermore, some researchers state that artificial intelligence is not a single technology, but an umbrella term that describes a wide range of technologies such as machine learning (ML), data mining, and natural

language processing. In addition, artificial intelligence can be defined as the creation of intelligent machines that exhibit human behavior and responses. This definition also includes computer-controlled machines that perform tasks similar to those performed by humans (Messeri & Crockett, 2024).

The transformation that artificial intelligence is generating in global education systems presents particularly significant challenges and opportunities in the context of continuing education or lifelong learning. Continuing education, understood as the learning process that extends beyond formal academic training and accompanies individuals throughout their professional and personal lives, has been conceptualized as an imperative in societies characterized by accelerated technological change and the rapid obsolescence of knowledge. In this educational paradigm, where professionals must constantly update their skills to remain relevant in dynamic labor markets, artificial intelligence is not just an additional technological tool, but a fundamental catalyst that redefines traditional teaching and learning models (Xia et al., 2024).

The strengths of applying artificial intelligence in continuing education are numerous and extend far beyond the automation of administrative processes. AI systems enable unprecedented personalization of the educational process by identifying individual learning patterns, detecting specific knowledge gaps, and generating optimized learning pathways for each student. This adaptability is invaluable for adults in continuing education, who frequently must balance work, family, and academic commitments, requiring flexibility and efficiency in their learning processes. AI also democratizes access to high-quality educational resources making available a capable tutor, providing thus continuous availability of intelligent virtual assistants, and offering immediate and detailed feedback on student progress—elements that traditionally required constant human intervention and considerable resources. Additionally, natural language processing and predictive analytics technologies allow educational institutions to anticipate emerging training needs, design programs that respond quickly to labor market transformations, and continuously evaluate the effectiveness of their pedagogical interventions.

The relevance of these ideas is magnified in specific linguistic and cultural contexts, such as the Arabic-speaking world, where the intersection of continuing education and artificial intelligence takes on additional dimensions of complexity and urgency. Recognizing this challenge, UNESCO organized an event titled "Exploring the Future of the Arabic Language in Artificial Intelligence" at its headquarters in Paris on December 18th, coinciding with World Arabic Language Day. The event brought together prominent scientists, AI experts, and cultural pioneers to explore ways to bridge the digital divide, promote heritage

preservation, and increase the Arabic language's presence on the Internet through AI-driven innovation. The sessions focused on strengthening digital capabilities, preserving culture and language, and advancing innovations in Arabic artificial intelligence (Joshi, 2024).

The urgency of this initiative becomes clear when considering that Arabic, despite being a global language with over 450 million speakers and official status in approximately 25 countries, has less than 3 percent Internet penetration, which severely limits millions of people's ability to access online resources (Joshi, 2024). This limited digital penetration represents a considerable obstacle to developing AI-mediated continuing education systems. The scarcity of robust Arabic datasets for training machine learning models, the language's morphological and syntactic complexity, and its dialectal diversity constitute technical barriers requiring significant investments in research and development. But beyond these technical considerations, the preservation of cultural and linguistic identity in an increasingly digitalized context raises important questions about designing AI systems that not only process Arabic efficiently but also respect and promote the cultural, historical, and literary richness associated with this ancient language (Senator et al., 2025).

Consequently, continuing education in the age of artificial intelligence represents a field of convergence between technical challenges, socioeconomic imperatives, ethical considerations, and cultural aspirations. This study analyzes the specific dynamics characterizing the integration of artificial intelligence in continuing education contexts for Arabic speakers, identifying both existing barriers and latent opportunities to build more inclusive, effective, and culturally relevant educational ecosystems.

DEVELOPMENT

How AI is Reshaping Self-Directed Education and Personal Development

Self-learning is not limited to mental knowledge, and in the age of artificial intelligence, there are innovations that we can use to self-learn everything we are capable of learning. Self-directed learning can be defined as the ability to acquire knowledge and develop skills independently. With the development of technology and the advancement of artificial intelligence, it has become possible to use AI capabilities to enhance and enable self-learning (Hong, 2023). Picture the fusion of self-directed learning and artificial intelligence, where natural aptitude and cultivated skills converge to reveal extraordinary, meaningful, and valuable results. Artificial intelligence is making rapid progress, revolutionizing every part of our daily lives such as medicine, transportation, communication, and even education for male and female students. Will cars drive without drivers? Will robots replace doctors? (Huang et al., 2022). Therefore, let's make AI our servant and helper,

not our leader, as AI forms an important part of the self-learning and human development experience.

Among the most important achievements of artificial intelligence, we can say that today, AI serves humans to such an extent that it has become one of the key components that many people, companies, and even countries are rapidly adopting for personal or professional development, thereby transforming the work environment and beyond. Countries are becoming stronger based on information and modern technologies. For example, the Kingdom of Saudi Arabia is one of the first countries to use artificial intelligence in order to strengthen its position as a top leading country based on a sustainable economy (Stryker & Holdsworth, 2024).

Regarding the impact of self-learning in the age of artificial intelligence, its effect is to provide an opportunity to develop one's skills, improve them effectively, and diversify one's learning across all areas. Among the best apps for self-learning experiences through AI include Poe, Gemini, ChatGPT, etc.

As any tool, before using it is important to set goals. Before you start studying, make sure you define the goals you want to achieve. Do you want to learn a new skill? Do you want to develop your knowledge in a particular field? By setting goals, you can precisely and effectively guide the AI's path toward achieving those goals. For example, analyze the following prompt: "I want to learn the skill of writing an email for a career goal in 10 minutes a day for a month". Here the user mentions what he wants to learn as a skill, the learning objective, and the duration. The outcome will be plan that suits the user needs for achieving the goal with the time and duration requirements.

Using artificial intelligence and self-learning, people can have the opportunity to learn and develop skills in a fun and exciting way. Enjoy the path they choose and take advantage of the available technology to enhance the self-learning experience. In this regard, artificial intelligence helps self-learning in many ways, including (Qu et al., 2022):

- Access to knowledge
- Personalized learning
- Interactive learning
- Quick access to information and educational resources
- Ability to customize content and experiences according to individual needs and interests
- Assessment of personal, professional, and academic levels without reference to other people
- Interaction and control of the learning process, allowing people to learn in multiple areas in a way and at a pace that suits them.

It is also important to know that artificial intelligence is created on the basis of the human brain, which is a huge network connecting about 100 billion cells. Simply put, this is how impulses pass from one neuron to another. Since this memory is simulated in the computer, you have to remember that artificial intelligence cannot defeat the human mind because it was created by the human mind. Therefore, it must be used to develop and strengthen us (Doğan, 2006). Sustainable education refers to education systems that maintain ecological, economic, and social balance to support the long-term learning and development of all students. Continuing education in the age of artificial intelligence aims to provide more effective, accessible, and personalized learning experiences using technology and data provided by artificial intelligence. We can explore the issue of continuing education and the role of artificial intelligence in this field under the following headings.

Artificial intelligence tools for Arabic professional development and upskilling

Artificial intelligence can deliver personalized learning materials based on students' learning styles, pace, and interests, helping students learn in a more effective and motivated manner. Such personalized approaches also contribute to inclusivity and equality in education by addressing learners' individual and social differences (Nuri et al., 2024). Furthermore, artificial intelligence analyzes student performance data and provides feedback to teachers, allowing them to respond more quickly and effectively to students' needs. AI-powered platforms enable students to learn from anywhere and at any time, offering significant advantages, particularly in distance education contexts.

In the realm of Arabic education specifically, artificial intelligence plays a major role in language learning by providing feedback on the rules and structure of the language. This capability helps students develop their language skills, especially in a language as rich and complex as Arabic. Studies on the derivational and structural development of languages demonstrate how linguistic systems evolve and adapt, which is also essential for AI-based language modeling (Ismayil, 2024). The methodological integration of psycholinguistic approaches enhances the reliability of AI-based language learning models, ensuring that data-driven systems better reflect cognitive language processes (Murad et al., 2025). Additionally, artificial intelligence enriches students' learning experiences by creating rich and diverse digital learning materials in Arabic, while also facilitating access to education for students from diverse geographies and socioeconomic backgrounds, thereby increasing inclusion in education.

Regarding the application of artificial intelligence for continuing education, these technologies support sustainable educational goals by developing innovative educational

methods. For example, students' learning experiences are enriched through technologies such as virtual reality (VR) and augmented reality (AR). Artificial intelligence also monitors and optimizes student learning processes through learning analytics, which allows teachers to guide students more effectively. Moreover, artificial intelligence develops educational programs that increase environmental awareness, raising students' consciousness about sustainability and contributing to the development of environmentally responsible individuals (Lampropoulos, 2025).

The age of artificial intelligence is an important tool for achieving the goals of sustainable education. These technologies improve the quality of education and provide a more equitable and inclusive learning environment. The use of artificial intelligence in Arabic education offers a wide range of benefits, from language learning to the development of teaching materials. The use of artificial intelligence in education has led to fundamental changes in learning and teaching processes, and the use of artificial intelligence in Arabic education is also part of these innovations. AI-powered chatbots allow students to practice the language and improve their Arabic speaking skills by enabling them to interact with these systems to learn grammar rules and vocabulary. Digital language platforms like Duolingo and Babbel use artificial intelligence algorithms to offer personalized lessons according to students' learning speed and level, creating adaptive learning experiences tailored to individual needs (Bicknell et al., 2023).

Through adaptive learning systems, artificial intelligence personalizes course content by identifying students' strengths and weaknesses, monitoring their progress and providing additional assistance as needed. Learning analytics enable artificial intelligence to analyze students' learning processes and provide detailed reports to teachers, allowing them to respond to students' needs more quickly and effectively. This data-driven approach ensures that instruction is optimized for each learner's specific requirements. In the area of pronunciation and listening skills, artificial intelligence helps students achieve correct pronunciation through speech recognition technology that identifies pronunciation errors and provides corrective feedback. AI-powered applications also provide audio texts and listening exercises to help students improve their listening comprehension skills. These tools create immersive language learning experiences that were previously difficult to achieve in traditional classroom settings.

Artificial intelligence provides interactive content in online classes through e-learning platforms that engage students and enrich the learning experience. Virtual teachers powered by AI answer students' questions and guide them, providing crucial support during periods of high teacher-student ratios. These virtual instructors ensure

that students receive timely assistance regardless of their instructor's availability. Furthermore, AI grades assignments and exams quickly and accurately through automated grading systems, reducing the workload of teachers and allowing students to receive feedback faster. Artificial intelligence optimizes learning processes by providing personalized feedback to students through sophisticated feedback systems that adapt to individual learning patterns. AI-powered translation tools help students understand Arabic texts better by providing automatic translation support, while grammar checking features examine students' written work for grammatical and spelling errors and suggest corrections. These comprehensive support tools create a robust learning ecosystem that addresses multiple aspects of language acquisition simultaneously (Senator et al., 2025).

Artificial intelligence offers great advantages for both teachers and students in Arabic education. Using these technologies makes language learning more efficient, accessible, and effective. With these innovations offered by artificial intelligence, students experience a more personalized and interactive learning experience. Many students and teachers have gained experience using artificial intelligence in learning Arabic, with AI-powered chatbots like ChatGPT helping students practice the language and improve their Arabic speaking skills. Additionally, artificial intelligence technologies such as sentiment analysis and personalized learning have made students' learning processes more efficient.

By using artificial intelligence technologies, teachers can better track student progress and provide personalized feedback. These technologies allow students to receive faster feedback while reducing teachers' workload. There are numerous successful projects and studies on the use of artificial intelligence in Arabic language learning that demonstrate these benefits in practice. For instance, some potential contributions of ChatGPT to Arabic language learning are the provision of students with personalized and rapid feedback in areas such as vocabulary, pronunciation, grammar, and translation (Yusuf, 2023). Beyond basic language skills, ChatGPT can also generate texts on specific topics and provide equivalents for idiomatic expressions. When students interact with ChatGPT in their native language, the system can respond in either the native or target language, offering flexible support. This capability to provide immediate, personalized feedback— independent of time and space—proves particularly valuable for student motivation, guidance, and autonomous learning in Arabic language acquisition (Lelepariy et al., 2023).

A systematic review by Huang et al. (2022) evaluated the effectiveness of AI-assisted chatbots in language learning, noting that chatbots can help improve students' speaking skills and allow them to personalize their learning.

The use of chatbots as teaching aids is gaining attention in language learning due to their ability to converse with students using natural language. While previous reviews have mostly focused on one or two narrow aspects of using chatbots in language learning, this review goes beyond reporting on the specific types of chatbots used in past empirical studies and examines the utility of chatbots across first language learning, second language learning, and foreign language learning. The main objective of the study was to reveal the possible technological, pedagogical, and social possibilities enabled by chatbots in the language learning process. The researchers conducted a systematic search and identified 25 empirical studies investigating the use of chatbots in language learning. They used an inductively based approach to identify the technological and pedagogical possibilities and challenges of using chatbots for students' language learning, while employing Garrison's social presence framework to analyze the social affordances of using chatbots in language learning.

The findings revealed three technological possibilities: timeliness, ease of use, and customization. From a pedagogical perspective, chatbots demonstrated utility in multiple capacities, functioning as an interlocutor, as a simulation tool, for content transmission, as help lines, and for providing recommendations. Furthermore, chatbots emerged as promoters of students' social presence through affective, open, and relational communication. However, the study also identified a number of challenges when using chatbots, including technological limitations, the novelty effect, and cognitive load issues. In order to meaningfully implement educational chatbots in language learning, the study proposed a number of initial design principles for chatbots and provided detailed suggestions for future research. These findings contribute to a more comprehensive understanding of how chatbots can be effectively integrated into language learning environments while acknowledging and addressing their current limitations.

Virtual and augmented reality applications help students learn Arabic in a more interactive and engaging way. Such applications allow students to experience virtual environments and make language learning more effective. Virtual and augmented reality represents one of the latest technological innovations in our modern world, serving a wide range of users. Virtual reality is an artificial intelligence-based technology that allows us to receive images from a three-dimensional virtual world instead of receiving them from two-dimensional screens, while augmented reality helps us integrate events in the virtual world with the real world using the object recognition features of devices (Lampropoulos, 2025).

Virtual reality truly makes a person feel that they are in a different world. When using this technology, we can obtain

a unique experience through graphics, sound, and narrative elements. This technology has been developing rapidly since 2010 (Nabiyev, 2012), with applications extending far beyond language learning. In the tourism sector, for instance, instead of looking at pictures of a vacation hotel, travelers can explore hotels in a virtual reality environment from their current location, viewing and touring the facilities in a full 360-degree frame. This immersive experience provides a much more comprehensive understanding of spaces than traditional photographs or videos could offer.

The healthcare field has also embraced virtual reality technology extensively. It is used to help doctors visualize surgical procedures, improve stress-related syndromes, and enhance medical education experiences (Nabiyev, 2012). In one notable case, a doctor in the United States saved a baby's life using virtual reality technology. Doctors who had to perform open-heart surgery on the baby were able to see every angle of the baby's heart through images displayed via virtual reality glasses, allowing them to plan and execute the procedure with unprecedented precision. This case confirmed that virtual reality is an important technology capable of saving human lives, demonstrating its potential to transform not only education but also critical medical interventions.

CONCLUSIONS

The pervasive advancement of technology has transformed all spheres of contemporary life, reaching a critical juncture where progress in any field cannot be discussed without acknowledging the pivotal role of information technologies. Social media networks and digital platforms are powerful tools that penetrate virtually every aspect of social life, offering accessible spaces for free sharing and dialogue without temporal, spatial, or logistical constraints. This technological landscape has created unprecedented opportunities for educational transformation, particularly in contexts where traditional learning faces significant barriers.

Within this framework, the integration of artificial intelligence in Arabic language education represents a transformative development with profound implications for distance learning across Arab contexts. AI technologies are being used to address challenges inherent to distance education by providing personalized learning experiences that adapt to each student's unique pace, style, and needs while offering immediate feedback and support. This individualization proves especially important in geographically dispersed populations where access to qualified Arabic language instructors may be limited. Moreover, AI-powered platforms democratize access to quality instruction by eliminating geographic restrictions and overcoming language barriers through automatic translation and multilingual support, making Arabic education accessible

to learners worldwide regardless of their location or linguistic background.

The practical benefits of AI extend beyond accessibility to encompass enhanced productivity and innovation in pedagogical approaches. Automated assessment systems reduce administrative burdens while providing timely feedback, enabling educators to focus on higher-level instructional design and student interaction. Interactive tools such as virtual reality environments, augmented reality applications, and AI-based chatbots create immersive learning experiences that transcend traditional classroom limitations, offering 24/7 support and authentic language practice opportunities. Furthermore, learning analytics capabilities allow educators to optimize instructional strategies through data-driven insights, identifying areas requiring intervention and continuously adapting content to meet evolving student needs.

In conclusion, artificial intelligence constitutes a powerful catalyst for revolutionizing Arabic language education, particularly within distance learning contexts prevalent across Arab regions. By simultaneously addressing challenges of access, personalization, and pedagogical innovation, AI provides economical and inclusive solutions that ensure quality education reaches diverse audiences regardless of socioeconomic background or geographic location. As technology continues to advance, the potential for AI to democratize and enhance Arabic language instruction remains substantial, promising a future where effective, engaging, and accessible education becomes a reality for all learners in the Arab world and beyond.

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