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Reorienting Arabic Language Education for the Transition from Industry 4.0 to Society 5.0

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Abstract

This qualitative library study examines how Arabic language education can respond to technological change during the transition from Industry 4.0 to Society 5.0. The study draws on scholarly literature and education policy documents and uses qualitative content analysis to develop a framework for reorienting instruction. The framework covers four curricular and pedagogical priorities: integrating digital literacy into the curriculum, using generative artificial intelligence and natural language processing for personalised learning and feedback, developing a digital Arabic language environment through immersive and collaborative activities, and strengthening critical thinking, communication, collaboration, and creativity through engagement with Arabic-Islamic scholarly traditions. Teacher competence, informed by the Technological Pedagogical Content Knowledge framework, is a fifth priority for implementation. The framework also addresses the verification of AI outputs, cultural bias, unequal access to technology, and the assessment of language use in digital settings.

Keywords: Arabic language education, educational technology, Industry 4.0, Society 5.0

A. Introduction

Advances in information and communication technology during the transition from Industry 4.0 to Society 5.0 have reshaped education worldwide, including foreign language teaching (Rahaman & Al-Mubarak, 2025). Arabic has long served as a language of religion, classical literature, and international communication. Its teaching now faces the challenge of adapting to digital environments (Hasan & Al-Farsi, 2024). Artificial intelligence, app-based materials, and interactive platforms are increasingly central to how teachers design learning activities (Nurhayati & Ahmad, 2025). In Arabic language education, Faizin (2023) discusses the modernisation of instructional media, while Faizin (2023) examines web-based media from the perspective of students in an Arabic language education programme.

Arabic language teaching is often associated with approaches that emphasise grammar (qawāʿid) and text memorisation. When these approaches give learners few opportunities to use Arabic in settings that reflect contemporary communication, learners may find it harder to see its relevance beyond school. They may also have fewer opportunities to develop skills for international communication. A clear pedagogical purpose helps teachers choose digital tools that support language learning. Faizin and Akmalia (2021), for example, discuss discovery learning in virtual Arabic instruction. A digital Arabic language environment (digital biʾah lughawiyyah) can extend opportunities to read, listen, interact, and produce Arabic.

Research on digital Arabic teaching includes studies of individual tools, such as mobile applications and e-learning platforms. These studies raise a broader question about how digital tools, teacher practices, curriculum goals, and Arabic linguistic and cultural content can work together. This article proposes an integrative model for reorienting Arabic language education around three elements: the pedagogical use of generative AI, digital literacy linked to the four Cs of twenty-first-century learning (critical thinking,

communication, collaboration, and creativity), and the continued study of Arabic linguistic and cultural traditions.

Implementing this reorientation calls for an adaptable curriculum, teachers who can make informed pedagogical decisions about technology, and digital materials aligned with language learning objectives. It also calls for learning environments where students can communicate in Arabic, interpret texts, and create content. These priorities give teachers and curriculum developers a basis for deciding how technology can expand opportunities for communication and literacy in Arabic.

This article examines how Arabic language education can respond to rapid technological change and proposes a framework for guiding that response. It also offers practical directions for teachers, curriculum developers, and policymakers designing Arabic language programmes for digital learning environments.

B. Research Method

This study used qualitative library research and qualitative content analysis to examine how Arabic language education can be reoriented in the digital era. Its materials were grouped into two categories. The core corpus consisted of scholarly articles from national and international journals, education policy documents, and books published between 2024 and 2026 that directly addressed artificial intelligence, technology-based instructional media, or contemporary Arabic language pedagogy. Supporting literature provided conceptual and historical context on twenty-first-century skills, digital literacy, digital Arabic language environments, and earlier applications of technology in Arabic instruction.

Documents were collected through systematic screening and assessment of their relevance to the research objectives. Relevant passages were coded and organised into themes. Analysis followed the framework of Miles et al. (2020), which involves data condensation, data display, and conclusion drawing and verification.

C. Findings and Discussion

The qualitative analysis of scholarly literature and recent education policy documents identifies four main areas for reorienting Arabic language education in the digital era. Together, these areas connect the selection of digital tools with decisions about curriculum, pedagogy, language environments, and learning outcomes.

Figure 1. Four priorities for Arabic language education in the digital era

Priority	Focus
Adaptive curriculum	Digital literacy and communication
Generative AI and digital pedagogy	Learning activities, personalised practice, and feedback
Digital Arabic language environment	Immersive and collaborative Arabic language use
The four Cs and cultural identity	Twenty-first-century skills and Arabic-Islamic scholarly traditions

1. Curriculum Reorientation: From Grammar Translation to Integrated Digital Literacy

Conventional Arabic instruction has often relied on the grammar-translation method (ṭarīqat al-qawāʿid wa-al-tarjamah), which emphasises structural analysis and memorisation. The proposed curriculum integrates digital literacy into core language instruction alongside the development of linguistic competence (Albantani & Zaenuddin, 2024).

Learning outcomes should include the ability to navigate, analyse, and produce Arabic texts in digital settings such as social media, digital corpora, and online academic journals. Habibi et al. (2023) report higher vocabulary retention and cross-cultural understanding among students who followed a digitally oriented curriculum than among students who relied on printed texts alone.

2. Generative AI and Responsive Digital Pedagogy

Generative AI tools such as ChatGPT and Claude, along with Arabic natural language processing (NLP) tools, can shift the teacher's role towards

facilitating learning and checking the quality of materials and feedback (Wahab & Maimunah, 2025). The proposed approach includes three applications.

Personalised learning. Teachers can use AI-assisted tasks to gauge learners' knowledge of grammatical inflection and parsing (iʿrāb), syntax, and vocabulary, then select materials suited to their needs.

Automated feedback. NLP tools can flag possible errors in grammar, spelling (imlāʾ), and writing style. Teachers remain responsible for deciding which feedback is warranted and how to communicate it to learners.

Instructional materials. Teachers can design prompts that generate interactive dialogue (ḥiwār) simulations suited to learners' proficiency levels and lesson objectives.

3. Developing a Digital Arabic Language Environment

A challenge in settings such as Indonesia is that learners may have limited exposure to Arabic beyond the classroom. A digital biʾah lughawiyyah can expand access to Arabic through immersive and collaborative activities.

Virtual reality (VR) and augmented reality (AR). Teachers can use simulations of situations such as shopping in an Arabic-speaking market, undertaking Hajj or Umrah, or taking part in an international academic discussion in a virtual environment (Mahliatussikah & Fakhrurrozi, 2023).

Asynchronous collaboration. Arabic-language social media and online forums can connect learners with Arabic speakers beyond the classroom (Falah et al., 2024).

4. Developing the Four Cs and Sustaining Arabic-Islamic Scholarly Traditions

The proposed reorientation combines the use of digital technology with continued engagement in Arabic-Islamic scholarship and culture. The table below illustrates how digital activities can develop the four Cs.

Four Cs	Application in Digital Arabic Language Learning
Critical thinking	Evaluate the credibility of online classical and contemporary Arabic sources and verify AI-generated translations.
Communication	Present academic ideas or public opinions in Standard Arabic through blogs, podcasts, and academic social media.
Collaboration	Use cloud-based tools to translate texts or create Arabic digital content in groups.
Creativity	Create digital calligraphy, multimedia essays, or short educational videos in Arabic.

Digital technologies can also support the digitisation, study, and dissemination of classical Arabic works (kutub al-turāth), making them accessible to wider audiences.

Implementation Challenges and Pedagogical Responses

The literature identifies three implementation challenges and corresponding responses.

Figure 2. Implementation challenges and mitigation strategies

Challenge	Mitigation strategy
AI hallucinations and grammatical errors	Cross-check outputs manually against authoritative references and classical works.
Cultural inaccuracies and value biases	Integrate Islamic ethics and Arabic cultural literacy into learning activities.
Digital and infrastructure gaps	Use hybrid resources with offline access and distribute learning modules.

AI Hallucinations and Errors in Grammatical Analysis

Generative AI can produce text that appears plausible while containing errors in Arabic grammatical analysis or rhetoric (Zaenuddin & Albantani, 2024). A human-in-the-loop approach makes verification part of the learning task. Learners compare AI-generated analyses with authoritative references, and teachers help them resolve discrepancies (Ritonga et al., 2023).

Communicative Etiquette and Cultural Bias

AI outputs may reflect cultural assumptions that overlook conventions of politeness and communication in Arabic-Islamic settings (Al-Shareef & El-Kilany, 2025). Teachers can address this issue by incorporating culturally grounded forms of address, norms of social interaction (muʿāmalah), and Islamic scholarly traditions into prompts and digital dialogue scenarios.

The Digital Divide

Differences in infrastructure between institutions can widen disparities in Arabic language education, particularly between urban schools and Islamic boarding schools or madrasahs in disadvantaged, frontier, and outermost areas (Fakhrurrozi & Mahliatussikah, 2023). Low-bandwidth tools and hybrid resources that work offline can give learners access to interactive materials where high-speed internet is intermittent (Syihabuddin & Rahmawati, 2024).

Assessment Framework for Digital Arabic Language Learning

Curriculum reorientation also changes what teachers need to assess. Multiple-choice grammar tests can assess recall of rules, while digital communication tasks require evidence of how learners use Arabic, evaluate AI-generated content, and collaborate online (Maimunah et al., 2025).

The proposed Digital Authentic Assessment Framework covers three domains.

Assessment Domain	Focus	Assessment Instrument
Digital language skills	Produce e-portfolios, multimedia essays, and spoken or written digital content.	Digital portfolios and rubrics for writing and speaking.
Critical AI literacy	Identify grammatical errors and revise AI-generated texts.	*Prompting and AI error-analysis tasks.*
Collaboration and communication	Contribute to digital group projects and participate in online discussions.	*Peer assessment and platform activity analysis.*

D. Conclusion

The transition from Industry 4.0 to Society 5.0 calls for a coordinated approach to Arabic language education. The proposed approach has four curricular and pedagogical priorities: integrating digital communication and literacy into the curriculum, using generative AI and NLP for guided independent learning and feedback, creating digital Arabic language environments through immersive and collaborative activities, and developing the four Cs through engagement with Arabic-Islamic scholarship and culture. A fifth priority concerns implementation. Teachers need technological pedagogical content knowledge (TPACK) to select tools appropriate to their objectives and access conditions, guide students in evaluating AI outputs, and integrate technology with greater confidence.

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