



Integration of Technology and 21st-Century Skills in the Arabic Language Curriculum: A Systematic Literature Review

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Abstract

This systematic literature review examines how technology and 21st-century skills, namely critical thinking, communication, collaboration, and creativity, are integrated into Arabic language curricula. Following the PRISMA 2020 protocol and a Population-Concept-Context framework, 90 records were identified through an AI-assisted database search; 78 studies published between 2017 and 2026 met the eligibility criteria and were synthesized thematically. The review finds that curriculum-embedded technologies, including learning management systems, gamification, mobile and blended learning, and multimedia materials, are consistently associated with gains in engagement, motivation, and skill-specific outcomes, while 4C-based material and lesson-plan redesign strengthens critical thinking, communication, collaboration, and creativity. Persistent constraints include uneven teacher technological pedagogical content knowledge, infrastructure gaps, and curricula that still lag behind policy ambitions such as Indonesia's Kurikulum Merdeka. The review concludes that sustained teacher professional development and institutional policy support are necessary conditions for translating isolated classroom innovation into systemic curriculum reform.

Keywords

technology integration; 21st-century skills; Arabic language curriculum; systematic literature review; PRISMA

مستخلص البحث

تستعرض هذه الدراسة، القائمة على منهج المراجعة الأدبية المنهجية وفق بروتوكول بريزما 2020، كيفية دمج التكنولوجيا ومهارات القرن الحادي والعشرين، وهي التفكير الناقد والتواصل والتعاون والإبداع، في مناهج تعليم اللغة العربية. باستخدام إطار السكان والمفهوم والسياق، تم حصر 90 دراسة عبر طبقة بحث بمساعدة الذكاء الاصطناعي، واستوفت 78 دراسة نُشرت بين عامي 2017 و2026 معايير الأهلية وخضعت للتحليل الموضوعي. تُظهر النتائج أن التقنيات المدمجة في المنهج، مثل أنظمة إدارة التعلم والتلعيب والتعلم المدمج والجوال والمواد متعددة الوسائط، ترتبط باستمرار بزيادة المشاركة والدافعية ونتائج مهارية محددة، في حين تعزز إعادة تصميم المواد وخطط الدروس القائمة على مهارات القرن الحادي والعشرين الأربع التفكير الناقد والتواصل والتعاون والإبداع. أما القيود المستمرة فتشمل تفاوت معرفة المعلمين التربوية التكنولوجية للمحتوى، والفجوات في البنية التحتية، ومناهج ما زالت متأخرة عن طموحات السياسات مثل منهج ميردكا المستقل في إندونيسيا. وتخلص الدراسة إلى أن التطوير المهني المستمر للمعلمين والدعم السياساتي المؤسسي شرطان ضروريان لتحويل الابتكار الصفّي المعزول إلى إصلاح منهجي شامل.

مهارات التفكير العليا؛ تعلم اللغة العربية؛ المراجعة الأدبية المنهجية؛ التعليم
PRISMA؛ الثانوي

كلمات
أساسية

Two parallel imperatives now shape language curriculum design worldwide: the integration of digital technology into teaching and learning, and the cultivation of what is widely termed 21st-century skills, most commonly operationalized as the 4Cs of critical thinking, communication, collaboration, and creativity (P21 Framework for 21st Century Learning). Arabic language education has not been exempt from this dual pressure. Curriculum developers, teachers, and policymakers across Indonesia, Malaysia, the Gulf, and beyond have in the past decade experimented with learning management systems, gamified applications, mobile and blended learning models, and multimedia materials, while simultaneously being asked to redesign lesson plans and teaching materials so that they explicitly build critical thinking, communicative competence, collaborative capacity, and creativity alongside linguistic proficiency (Moustafa Sapawi et al., 2025; Susanto et al., 2022). In Indonesia specifically, this pressure has been formalized through the Kurikulum Merdeka (Independent Curriculum) policy, which foregrounds the 4C competencies as an explicit curricular target rather than an incidental by-product of language instruction (Ainy Khairun Nisa et al., 2025; Azwar Annas et al., 2025).

A substantial and rapidly growing body of empirical work now documents how this dual integration is unfolding in practice. Teacher-facing studies report that technological pedagogical content knowledge, commonly assessed through the TPACK framework, remains uneven among Arabic teachers, with technology often used at a basic communicative level rather than to support innovative, interactive teaching (Sholahudin et al., 2025; Jwaifell et al., 2018). Curriculum- and materials-facing studies report that learning management systems, gamified platforms, mobile applications, and multimedia tools are associated with gains in motivation, engagement, and specific language-skill outcomes (Ziaul Haq et al., 2024; Almelhes, 2024), while 4C-oriented material and lesson-plan redesign is reported to strengthen learners' critical thinking, communicative competence, collaborative capacity, and creativity when deliberately embedded rather than left implicit (Yayah Robiatul Adawiyah et al., 2025; M. Sarip et al., 2024). At the same time, a consistent countervailing pattern is reported across this literature: infrastructure gaps, uneven teacher readiness, and curricula that have not yet caught up with policy ambition (Muhammad Abdun Jamil et al., 2024; Amrini Shofiyani, 2025).

This is the field-level pattern that motivates the present review, and it is one that the literature itself has already begun to notice piecemeal. At least seven recent systematic literature reviews have each mapped a narrower slice of this landscape: technology integration in Arabic curricula in general (Mior Syazril Mohamed Sapawi et al., 2025, synthesizing 20 studies from Scopus, Web of Science, and ERIC between 2023 and 2025), mobile-assisted language learning specifically (Aini Nurazizah et al., 2026, following PRISMA and MMAT quality appraisal), e-learning and mobile applications (Alsadika Ziaul Haq et al., 2024, drawing on Scopus, Web of Science, ERIC, and Google Scholar between 2019 and 2024), gamification (Sultan A. Almelhes, 2024, 15 studies), ICT-based problem-based learning design (Fadlan Masykura Setiadi et al., 2025, 75 studies across five databases), TPACK-based teacher competence (Shofwan Sholahudin et al., 2025, 17 studies), and learning-management-system adoption specifically (Fadhil Izzan et al., 2025, 20 studies from Google Scholar). Each of these reviews is methodologically sound within its own narrower scope, but none combines technology integration with 21st-century-skills integration as parallel, comparably weighted curricular concerns, and none spans the fuller decade-long window (2017 to 2026) needed to trace how curriculum policy shifts such as Kurikulum Merdeka have interacted with technology adoption over time. This is the research gap the present review addresses.

Accordingly, this review aims to (1) map the range of technologies and 21st-century-skills-oriented approaches that have been integrated into Arabic language curricula, (2) synthesize what the literature reports about the outcomes and enabling conditions of this integration, and (3) synthesize the constraints that limit or complicate it, drawing only on claims traceable to studies retrieved during the course of the review. Its contribution is threefold: it offers curriculum developers and teacher educators a single, up-to-date evidence map spanning both technology and 21st-century-skills integration rather than either in isolation; it explicitly positions this review against the seven narrower prior reviews identified above, clarifying what a broader, longer-window synthesis adds; and it provides a transparent, reproducible search and screening record. The remainder of the article proceeds as follows. The Method section describes the review protocol, search strategy, eligibility criteria, and PRISMA 2020 flow of records. The Results and Discussion section presents the characteristics of the included studies and synthesizes findings under the organizing themes of technology integration, 21st-century-skills integration, and curriculum-policy transformation. The Conclusion summarizes the review's findings and proposes directions for future research.

طريقة البحث

This review followed the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) reporting protocol, adapted for a thematic rather than a meta-analytic synthesis, because the review question concerns qualitatively different integration approaches and outcomes rather than a single pooled quantitative effect.

Review question and framework

The review question was framed using the Population-Concept-Context (PCC) framework recommended for scoping-style systematic reviews. Population was defined as learners, teachers, and curriculum developers in Arabic language education, at any education level and in any setting. Concept was defined jointly as (a) the integration of technology, including learning management systems, gamification, mobile and blended learning, multimedia and interactive media, and artificial intelligence where curriculum-relevant, and (b) the integration of 21st-century skills, operationalized as the 4Cs (critical thinking, communication, collaboration, creativity) together with digital literacy, within curriculum design, teaching materials, lesson planning, or teacher competence frameworks such as TPACK. Context was defined as Arabic language curriculum development and implementation settings, whether formal (schools, universities, Islamic boarding schools) or informal.

Eligibility criteria

Records were eligible if they (a) addressed technology integration and/or 21st-century-skills integration specifically within Arabic language curriculum design, teaching materials, lesson planning, or teacher competence; (b) had an explicit curricular or pedagogical focus rather than being purely technical development work with no curriculum-facing evaluation or discussion; and (c) were published as a peer-reviewed journal article, conference proceeding paper, or systematic/scoping review. Records were excluded if they concerned a language other than Arabic, if they lacked any discernible technology or 21st-century-skills angle even where Arabic curriculum was the general subject, or if they were preprints, unpublished theses, or from venues that could not be verified as peer-reviewed. Prior systematic reviews of near-identical or substantially overlapping scope were identified and retained as related work cited in the Introduction and Discussion, but were not double-counted as primary sources in the synthesized

corpus, consistent with standard practice for positioning a new review against existing reviews.

Search strategy

Search terms were built from the PCC concept blocks, combining Arabic-language-curriculum vocabulary in English and Indonesian with technology and 21st-century-skills terms (for example, “technology integration”, “21st century skills”, “4C”, “digital literacy”, “ICT”, “blended learning”, “mobile learning”, “gamification”, “TPACK”, “learning management system”, and “multimedia” combined with “Arabic language curriculum”, “kurikulum bahasa Arab”, and “pembelajaran bahasa Arab”). As in the companion review this article builds methodological practice from, live queries to subscription bibliographic databases such as Scopus and Web of Science were not available in this review session; this is stated explicitly as a limitation. Records were identified through a single AI-assisted multi-database discovery layer (Consensus, drawing on Semantic Scholar, Scopus-indexed records, PubMed, and arXiv), queried with ten concept-block query variants (Table 1). This search yielded 90 uniquely titled records; because only one search channel was used in this iteration, citation snowballing was not performed, and this is noted as a further limitation relative to a fully exhaustive search.

Table 1. Search query themes

No.	Query theme
1	Technology integration, Arabic language curriculum
2	21st-century skills, Arabic language education, curriculum
3	Digital literacy, ICT, Arabic language teaching, curriculum design
4	Blended learning, mobile learning, Arabic language curriculum design
5	Gamification, project-based learning, Arabic language curriculum, 21st century
6	TPACK framework, Arabic language teacher, curriculum readiness
7	Critical thinking, creativity, Arabic language learning material development
8	Kurikulum Merdeka, Arabic language curriculum, digital transformation, higher education
9	Learning management system, e-learning platform, Arabic curriculum, higher education
10	Multimedia, interactive media, Arabic language curriculum development, student engagement

Selection process

One reviewer, assisted by an AI-based research tool for record retrieval and initial classification, screened all 90 records against the eligibility criteria in two stages.

Because a second independent human screener was not involved, inter-rater reliability was not computed, and this is reported as a limitation. At the title-and-abstract stage, 4 records were excluded for lacking any discernible technology or 21st-century-skills angle, leaving 86 reports assessed for eligibility. At the eligibility stage, a further 8 reports were excluded: 7 for being prior systematic reviews of near-identical or substantially overlapping scope (retained instead as related work, see Introduction and Discussion), and 1 for a concept mismatch discovered on closer reading (the study addressed co-curricular soft-skills outcomes rather than curriculum-embedded technology or 21st-century-skills integration). Seventy-eight studies, published between 2017 and 2026, were included in the final synthesis. Figure 1 presents the PRISMA 2020 flow diagram.

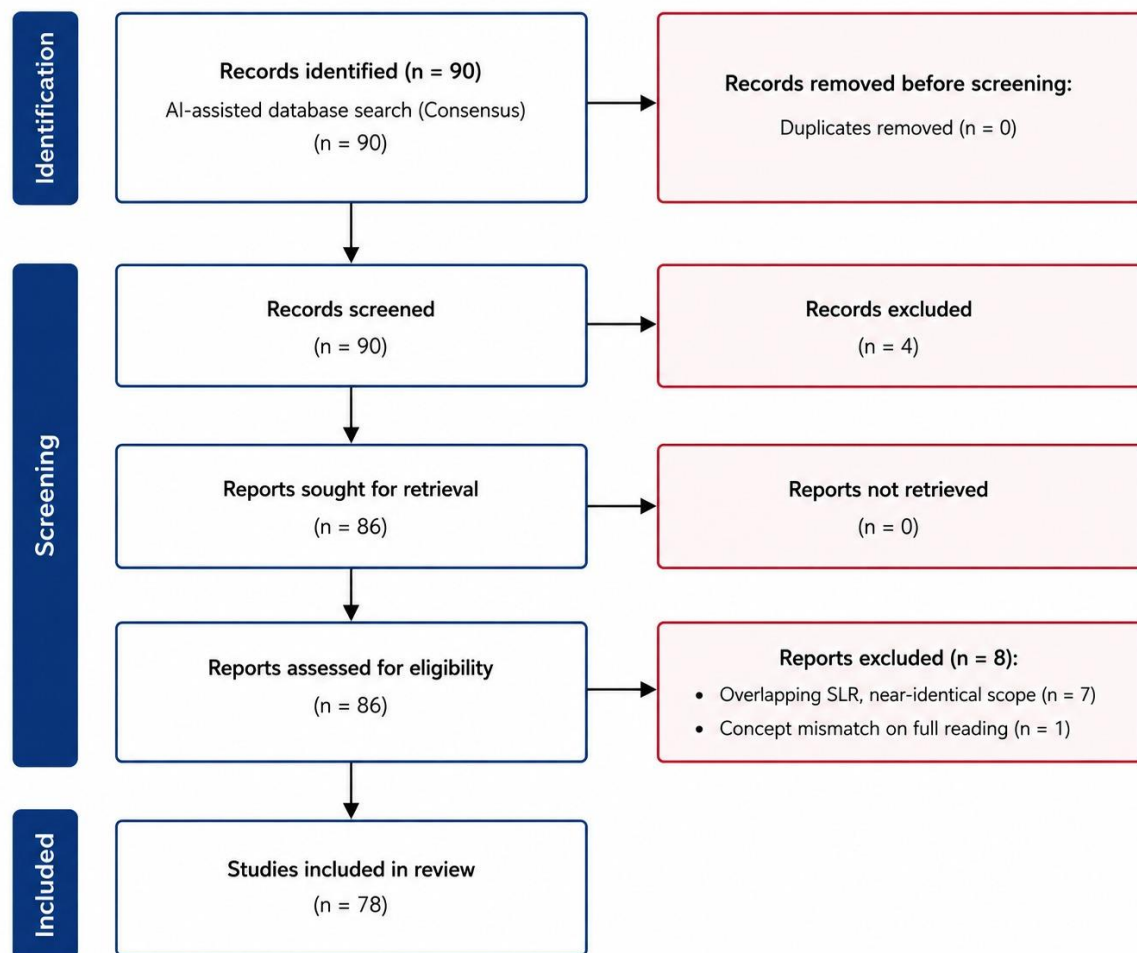


Figure 1. PRISMA 2020 flow diagram of record identification, screening, and inclusion

Data extraction and synthesis

For each included study, the following information was extracted where reported: first author and year, technology or 21st-century-skills focus, educational context and country or region, and study design. Table 2 summarizes these characteristics

across all 78 included studies. Because the included literature combines experimental, survey, qualitative case-study, research-and-development, and conceptual or literature-review designs addressing a common but non-comparable set of outcomes, the studies were synthesized narratively using thematic analysis rather than statistically pooled. Three organizing themes, technology integration, 21st-century-skills integration, and curriculum-policy transformation, were used as the primary coding frame; within each theme, sub-themes were derived inductively from patterns recurring across at least three independent studies. Full multi-author lists could not be independently verified for every included record beyond first-author-level indexing metadata; where this applies, citations use “et al.” and this is noted as a further transparency limitation.

Table 2. Characteristics of included studies (n = 78)

Author, Year	Technology / 21st-century-skills focus	Educational context	Study design
Harfi Ade Febra Putra et al., 2026	TPACK, LMS (Edu-Panda)	Islamic senior high school, Indonesia	Qualitative case study
Muhammad Abdun Jamil et al., 2024	General digital technology	Islamic college (STIT), Indonesia	Descriptive qualitative
Faiza Amaliyah et al., 2025	Digital tools, e-learning, apps	Multiple institutions	Case study, survey
Ainy Khairun Nisa et al., 2025	TPACK, Kurikulum Merdeka	Madrasah Aliyah, Indonesia	Qualitative case study
Rosli Hady et al., 2025	Digital technology, general	Islamic boarding school, Indonesia	Mixed methods
Laili Mas Ulliyah Hasan et al., 2024	TPACK curriculum integration	Senior high school	Qualitative case study
Syamfa Agny Anggara & Afif Kholisun Nashoi, 2025	Media and technology, general	Literature-based, general	Library research
Sarah Sarah et al., 2024	E-learning, audiovisual, games	Literature-based, general	Literature review
Adhi Nugraha et al., 2025	AI, curriculum foundations	Islamic boarding school, Indonesia + comparative	Qualitative exploratory
Mahmoud Hela Abdel Baset Abdel Qader, 2024	Content analysis, 4Cs+digital literacy	Primary school, Egypt	Content analysis
Susanto et al., 2022	Online technology, 4C	Islamic boarding school, Indonesia	Qualitative case study
Fatimah Azzahra Putri et al., 2026	Curriculum design, 21st century skills	Literature-based, general	Qualitative descriptive
Yayah Robiatul Adawiyah et al., 2025	4Cs framework	Pesantren-based university, Indonesia	Qualitative descriptive

Author, Year	Technology / 21st-century-skills focus	Educational context	Study design
Aziz, Hasan & Rido'i, 2024	4C curriculum analysis	School, Indonesia	Qualitative descriptive
M. Sarip et al., 2024	6C skills, animation video	University, Indonesia	R&D, Borg & Gall
Amrini Shofiyani, 2025	KKNI curriculum, digital tech	University, Indonesia	Evaluative case study
Agus Ghulam Firza, 2024	21st century skills, lesson plan	Conceptual, general	Library research
N. Rahmawati, 2024	Interactive digital materials, 21st century skills	STAI, Indonesia	R&D, ADDIE
Bingxin Gu et al., 2025	Digital literacy syllabus	Teacher education university, China	One-group pretest-posttest
Ahmadi et al., 2024	Digital literacy, technology	Madrasah Ibtidaiyah, Indonesia	Qualitative case study
Sugino Sugino et al., 2025	ICT, TBLT, CLT	Literature-based, general	Literature review
A. Baity et al., 2025	Technology, multicultural curriculum	Literature-based, Indonesia	Literature review
Bingxin Gu et al., 2024	Digital literacy, needs analysis	Pre-service teachers, China	Needs analysis (interviews)
Mahmudi A. R., 2026	Digital literacy, e-learning platform	Higher education, general	Literature review, conceptual
A. Firdaus et al., 2025	Digital native pedagogy, 4C	Literature-based, Indonesia	Literature review
Inass El-Khatib, 2025	Blended learning	Middle school, Lebanon	Descriptive qualitative
T. Mohammed et al., 2021	Blended syllabus, ADDIE, CALL/MALL	Higher education, South Africa	Design & development study
Fathor Rozi et al., 2021	Blended learning management	Madrasah Aliyah, Indonesia	Qualitative case study
Khasan Aedi et al., 2025	Mobile application (An-Nasr)	Senior high school, Indonesia	R&D, ADDIE (partial)
Noor Zinatul Hamidah et al., 2024	Blended learning (Alef platform)	Literature-based, general	Literature review
Sameer M. Alnajdi, 2017	Blended learning, ASSURE model	Elementary school, USA	Design study, field trial
Samsuar Arani et al., 2024	Blended learning, Society 5.0	Literature-based, general	Literature review
Khabibatun Nisa' et al., 2026	Blended learning, assessment	Madrasah Ibtidaiyah, Indonesia	Descriptive qualitative
Mohammad Taufiq Abdul Ghani et al., 2022	Mobile digital game	Tertiary level, Malaysia	Qualitative interviews
Mohammad Ahsanuddin et al., 2025	Gamification (Construct 2), assessment	Junior high school, Indonesia	True experimental
Farha Fuada et al., 2025	Gamification tools, trends	Literature-based, general	Literature review

Author, Year	Technology / 21st-century-skills focus	Educational context	Study design
Melisa Rezi et al., 2024	Gamification, motivation	Higher education, general	Quantitative survey
Ummi Syarah Ismail et al., 2023	Gamification framework	Schools, Malaysia	Conceptual framework
Mohd Amran Bin Jaafar et al., 2022	Gamification module (MGdPBA)	Primary school, Malaysia	Quasi-experimental
A. Arribathi et al., 2024	Gamified platform, TAM	Higher education, Indonesia	Quantitative survey
Y. Suryadarma et al., 2025	Gamification (FPS game)	Islamic elementary school, Indonesia	R&D, waterfall model
Mustafa Jwaifell et al., 2018	TPACK, flipped classroom readiness	Schools, Jordan	Quantitative survey
Rifda Haniefah et al., 2023	TPACK application	Literature-based, general	Qualitative literature study
Ahmad Taufiq et al., 2023	TPACK, lesson planning	Vocational school, Indonesia	Qualitative field research
Muhammad Ediyani et al., 2025	TPACK + DigCompEdu, teacher competence	Literature-based, general	Conceptual review
U. Hanifah et al., 2024	TPACK, digitalisation	Pre-service teachers, Indonesia	Qualitative
Harmanto Raharjo et al., 2026	LLM/AI readiness, TPACK	Literature-based, general	Qualitative library research
A. Tarmizi et al., 2022	HOTS-based writing material	University, Indonesia	R&D, Bolito & Julie model
Amami Shofiya Al Qorin et al., 2025	Communicative materials, 21st century skills	Schools, Thailand	R&D, ADDIE
M. Anwar et al., 2025	Critical thinking, Quizlet	Madrasah Diniyah, Indonesia	Quantitative one-group pretest-posttest
Salma Hayati et al., 2025	Creativity, PjBL materials	University, Indonesia	Qualitative descriptive
Fadlan Masykura Setiadi et al., 2026	Critical thinking, local-wisdom materials	Islamic higher education, Indonesia	R&D, ADDIE
Yuli Susanti et al., 2023	Critical thinking, Liveworksheet	Senior high school, Indonesia	R&D, PIE model
Z. EdyMurdani et al., 2021	Critical thinking, reading material	Higher education, Indonesia	R&D, Balitho & Jolly model
Nur Azizah et al., 2025	Digital transformation, TPACK+V	Literature-based, Indonesia	Qualitative literature review
A. Latifah et al., 2025	Curriculum transformation, digital tech	Literature-based, Indonesia	Literature review
R. Amalia et al., 2025	Kurikulum Merdeka, digital tech	Madrasah, Indonesia	Qualitative descriptive

Author, Year	Technology / 21st-century-skills focus	Educational context	Study design
Naifah et al., 2025	Digital module, Kurikulum Merdeka	Madrasah, Indonesia	R&D, ADDIE
Ilham Nur Kholiq, 2025	Digital curriculum competitiveness	Islamic university, Indonesia	Qualitative case study
Azwar Annas et al., 2025	Kurikulum Merdeka, 4C competencies	Literature-based, Indonesia	Literature review
Meliza Budiarti et al., 2022	LMS (Padlet)	Higher education, general	Descriptive study
Mahyudin Ritonga et al., 2024	E-campus platform	Islamic state university, Indonesia	Quantitative survey
Moh. Ismail et al., 2023	LMS (arabi.id)	University, Indonesia	Quasi-experimental
Ahmad Ubaedi Fathuddin et al., 2025	Web-based LMS	Islamic state university, Indonesia	R&D, ADDIE
N. Siregar et al., 2025	Digital platforms	Islamic university, Indonesia	R&D, ADDIE
R. Taufiqurrochman et al., 2020	LMS perceptions, blended learning	Higher education, Indonesia	Descriptive survey
S. O. Makinde et al., 2024	LMS (Moodle), flipped learning	University, Nigeria	Proposal, mixed methods (planned)
Muhyidin Yahya et al., 2021	Online learning management	Schools, Indonesia	Descriptive qualitative
Muflihah et al., 2025	Interactive multimedia materials	Islamic universities, Indonesia	Quasi-experimental
Bintang Parikesit et al., 2025	Interactive media (InShot)	Schools, Indonesia	R&D, ADDIE
Achmad Makki Lazuardi et al., 2024	Interactive learning programs	Islamic boarding school, Indonesia	Mixed methods
Putri Kholida Faiqoh et al., 2025	Digital media, technology	Literature-based, general	Library research
M. Habib, 2025	AI, gamification, AR (speaking)	Islamic junior high school, Indonesia	Quasi-experimental
Menik Mahmudah et al., 2026	Multimodal design (infographics, video)	Madrasah Aliyah, general	Mixed methods, ADDIE
A. Safitri et al., 2025	Digital interactive media	Madrasah Ibtidaiyah, general	Literature review
Binti Mar'atul Muthongah et al., 2025	Interactive media (Quizizz)	Junior high school, Indonesia	R&D, ADDIE
Elok Fikril Hanik et al., 2025	Audio, visual, multimedia	General, digital era	Mixed methods
Ruby Syahira et al., 2026	Interactive media (Flipbook)	Madrasah Aliyah, Indonesia	R&D, ADDIE

Of the 78 included studies, the large majority ($n = 61$) were published in 2024 or later, indicating that empirical interest in this combined agenda has accelerated sharply in the last three years; only 2 studies predate 2020. Geographically, Indonesia is by far the most represented research context ($n = 46$ of 78), reflecting the country's active Islamic higher education and madrasah research ecosystem and its Kurikulum Merdeka policy reform; a further 20 studies are literature-based or do not specify a single country, and the remainder are distributed across Malaysia, China, Egypt, Jordan, Thailand, Lebanon, South Africa, the United States, and Nigeria. Methodologically, qualitative case studies and interview-based designs are the largest category ($n = 24$), closely followed by research-and-development or instructional-design studies typically using the ADDIE model ($n = 19$) and literature reviews or conceptual papers ($n = 18$), with quasi-experimental or experimental designs ($n = 7$), quantitative surveys ($n = 6$), mixed-methods designs ($n = 3$), and content analysis ($n = 1$) comprising the remainder. Thematically, studies oriented around 21st-century-skills curriculum design (the 4Cs) form the single largest cluster ($n = 17$), followed by TPACK and teacher-competence studies, general digital-technology studies, and blended or mobile learning studies ($n = 10$ each), gamification ($n = 8$), multimedia and interactive media ($n = 7$), curriculum-transformation and policy studies ($n = 6$), and digital-literacy-focused studies ($n = 4$).

Technology integration in the Arabic language curriculum

Learning management systems and e-learning platforms. A consistent cluster of studies documents the curricular adoption of learning management systems, ranging from general-purpose platforms such as Moodle, Google Classroom, and Padlet to purpose-built systems such as arabi.id and e-campus portals (Meliza Budiarti et al., 2022; Moh. Ismail et al., 2023; Mahyudin Ritonga et al., 2024). Quasi-experimental evaluations report measurable gains: the arabi.id system produced statistically significant improvements across listening, speaking, reading, and writing proficiency relative to a control group (Moh. Ismail et al., 2023), while a web-based LMS built specifically for an Indonesian Islamic university raised average examination scores by 15 percent (Ahmad Ubaedi Fathuddin et al., 2025). Student-perception studies converge on a common finding: LMS effectiveness depends less on the platform itself than on teachers' digital readiness and the availability of contextually appropriate digital materials, with authentic speaking

practice (muhadatsah) remaining the hardest skill to support through an LMS alone (Fadhil Izzan et al., 2025; R. Taufiqurrochman et al., 2020).

Blended and mobile learning. Blended-learning redesign, combining face-to-face and online instruction, is reported across primary, secondary, and higher-education Arabic curricula, typically framed through established instructional-design models such as ADDIE or ASSURE (T. Mohammed et al., 2021; Sameer M. Alnajdi, 2017). Studies conducted during and after the COVID-19 pandemic describe blended and fully online curriculum redesign as a forced but ultimately productive accelerant of digital pedagogy, provided teachers received adequate planning support (Fathor Rozi et al., 2021; Muhyidin Yahya et al., 2021). Mobile-assisted approaches, including purpose-built applications such as An-Nasr, report that curriculum-alignment and multimodal scaffolding, rather than device availability alone, determine adoption and learning gains, with grammar consistently identified by students as the primary obstacle mobile tools need to address (Khasan Aedi et al., 2025; Mohammad Taufiq Abdul Ghani et al., 2022).

Gamification. Gamified curriculum elements, from commercial platforms such as Duolingo, Memrise, Quizizz, and Kahoot to purpose-built modules and game-based assessment tools, are reported with unusual methodological consistency to improve motivation, engagement, and vocabulary or grammar mastery among non-native Arabic learners (Mohammad Ahsanuddin et al., 2025; Mohd Amran Bin Jaafar et al., 2022). A Technology Acceptance Model evaluation of a gamified platform found perceived ease of use and perceived usefulness both significant predictors of continued use intention (A. Arribathi et al., 2024), while a framework study cautions that gamification's motivational effect is moderated by teachers' own attitude and commitment to the approach, meaning curriculum-level gains are not guaranteed by the technology alone (Umami Syarah Ismail et al., 2023).

Multimedia and interactive media. Interactive and multimedia materials, including infographics, animated video, augmented reality, flipbooks, and text-to-speech tools, are reported across a wide age range from elementary madrasah to university level (Muflihah et al., 2025; Menik Mahmudah et al., 2026). Where pretest-posttest data are available, effect sizes are often large: one multimodal infographic-and-video intervention produced statistically significant vocabulary and grammar gains grounded in Mayer's Cognitive Theory of Multimedia Learning (Menik Mahmudah et al., 2026), and an AI-assisted, gamified, and augmented-reality speaking intervention produced a 32.5 percent post-test gain compared with 12.3 percent in a traditional-instruction control group (M. Habib, 2025).

21st-century-skills integration in the Arabic language curriculum

4C-based curriculum and material redesign. The largest single thematic cluster in this review concerns deliberate redesign of Arabic curricula and materials around the 4Cs. Content-analysis research on a national primary curriculum found career and life skills and information-media-technology skills more strongly represented than learning-and-innovation skills, suggesting uneven coverage of the 4Cs even within a single curriculum document (Mahmoud Hela Abdel Baset Abdel Qader, 2024). Case studies of 4C-based curriculum implementation at the higher-education level report that integrating critical thinking, creativity, communication, and collaboration strengthens learners' contextual understanding and real-life communicative relevance, while consistently identifying instructor readiness and capacity as the binding constraint on effective implementation (Yayah Robiatul Adawiyah et al., 2025; Aziz, Hasan & Rido'i, 2024). Materials-development studies extend the 4Cs to a 6Cs framework (adding, for example, character and citizenship) embedded in animation-based speaking materials, and report that ADDIE-based development processes can operationalize these competencies concretely within a single course (M. Sarip et al., 2024).

Critical thinking and creativity in materials design. A distinct cluster of research-and-development studies targets critical thinking and creativity specifically, often through higher-order-thinking-skills (HOTS) writing materials, local-wisdom-grounded reading materials, or project-based material design tasks (A. Tarmizi et al., 2022; Fadlan Masykura Setiadi et al., 2026). These studies report that critical thinking develops most reliably when materials require learners to analyze, evaluate, and re-express content in their own words rather than simply comprehend it, and that project-based approaches additionally cultivate learners' own material-design creativity as a transferable professional skill for future Arabic teachers (Salma Hayati et al., 2025).

Digital literacy and teacher competence (TPACK). Teacher-facing studies converge on a specific diagnosis: Arabic teachers' content and pedagogical knowledge is typically adequate, but their technological knowledge, the T in TPACK, lags behind, and where digital literacy syllabi have been deliberately designed and trialed, they produce measurable gains across technical, cognitive, attitudinal, and social-emotional digital-literacy domains within as little as two weeks (Bingxin Gu et al., 2025). A conceptual synthesis proposes extending TPACK with DigCompEdu to cover six competence dimensions, including collaborative and ethical dimensions not captured by TPACK alone (Muhammad Ediyani et al., 2025), while emerging

work on generative AI and large language models finds teacher readiness for these newer tools still at an early and uneven stage, shaped by digital literacy, psychological disposition, and institutional support rather than technical knowledge alone (Harmanto Raharjo et al., 2026).

Curriculum-policy transformation

A smaller but analytically important cluster situates technology and 21st-century-skills integration within formal curriculum policy, above all Indonesia's Kurikulum Merdeka. These studies report that the policy's flexibility formally licenses project-based, technology-integrated, and 4C-oriented instruction, and that teachers who adopt this flexibility report positive shifts toward communicative, differentiated, and collaborative teaching (R. Amalia et al., 2025; A. Latifah et al., 2025). At the same time, implementation studies caution that policy flexibility alone does not guarantee curricular change: limited teaching modules, insufficient structured teacher training, and uneven institutional support are repeatedly identified as the gap between what Kurikulum Merdeka permits and what classrooms actually deliver (Naifah et al., 2025; Ilham Nur Kholiq, 2025).

Synthesis and comparison with prior reviews

Read together, the technology-integration and 21st-century-skills-integration literatures reviewed here are best understood as two expressions of a single underlying curricular shift, from content transmission toward a more adaptive, skill-oriented, learner-centered model of Arabic instruction, rather than as two separate agendas. The consistent common denominator limiting both is not technological or pedagogical possibility but institutional readiness: teacher technological pedagogical content knowledge, structured professional development, and policy support that follows through on curriculum flexibility with concrete resourcing. This pattern is broadly consistent with, and extends, the seven narrower prior reviews identified in the Introduction. Where Sapawi et al. (2025) found technology integration constrained by teacher preparedness and infrastructure within a 2023-2025 window, and Sholahudin et al. (2025) found technological knowledge specifically lagging within TPACK, the present broader and longer-window synthesis shows the same constraint recurring across the 21st-century-skills literature and the curriculum-policy literature as well, suggesting it is a structural feature of Arabic curriculum reform rather than a limitation specific to any one technology or skill. A further pattern this broader review surfaces that the narrower prior reviews could not, given their single-theme scope, is the near-total absence of studies that evaluate technology integration and 4C-skills integration jointly within a single curriculum design, despite both being pursued in parallel by

the same policy instruments such as Kurikulum Merdeka; the literature to date treats them almost entirely as separate research programs.

الاستنتاج والخاصة

This systematic review synthesized 78 studies, identified through an AI-assisted database search and screened against explicit PRISMA 2020 criteria, to map how technology and 21st-century skills are being integrated into Arabic language curricula. The evidence base shows that curriculum-embedded technologies, learning management systems, blended and mobile learning, gamification, and multimedia materials, are consistently associated with gains in engagement, motivation, and skill-specific outcomes, and that deliberate 4C-based redesign of materials and lesson plans strengthens critical thinking, communication, collaboration, and creativity when these competencies are made explicit curricular targets rather than left as incidental by-products of language instruction. These gains are consistently reported alongside a comparably weighted set of constraints: uneven teacher technological pedagogical content knowledge, infrastructure gaps, and curricula that have not yet caught up with the ambitions of policy instruments such as Kurikulum Merdeka. Positioned against seven narrower prior systematic reviews on technology integration, mobile-assisted learning, e-learning, gamification, ICT-based instructional design, TPACK, and learning-management-system adoption, this review's broader and longer-window synthesis indicates that institutional and teacher-readiness constraints, rather than the technologies or frameworks themselves, are now the field's central bottleneck.

Further research should prioritize four directions suggested by the gaps identified in this review. First, studies that evaluate technology integration and 4C-skills integration jointly within a single curriculum design are needed, since the literature to date treats them almost entirely as separate research programs despite shared policy origins. Second, more experimental and quasi-experimental studies with comparison conditions are needed across both agendas, since qualitative case studies and research-and-development designs currently predominate. Third, longitudinal studies tracking curriculum-policy implementation, particularly Kurikulum Merdeka, over multiple years would clarify whether current policy-practice gaps narrow with sustained institutional investment. Fourth, given that this review's search was conducted through a single AI-assisted discovery layer without citation snowballing or manual export from subscription databases such as Scopus and Web of Science, a subsequent review with full manual multi-database access,

independent dual screening, and complete author-list verification would strengthen confidence in the precise counts reported here, even though the substantive thematic pattern is unlikely to change with a larger corpus. With these caveats, the overall conclusion of this review is that technology and 21st-century-skills integration hold substantial and increasingly well-documented promise for Arabic language education, provided curriculum reform is matched by sustained investment in teacher professional development and institutional policy support.

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المراجع

- A. Arribathi et al. (2024). Evaluating Gamified Platform for Enhancing Arabic Language Proficiency Using TAM. Proc. ICCIT.
- A. Baity et al. (2025). Advancing Arabic Language Learning in the Digital Era: A Multicultural Curriculum Framework. Cendekiawan: Jurnal Pendidikan dan Studi Keislaman.
- A. Firdaus et al. (2025). Strategies and Learning Models for Arabic Language Instruction Based on the Independent Curriculum for the Digital Native Generation. Proceeding of International Conference on Islamic Education (ICIED).
- A. Latifah et al. (2025). Transformasi Kurikulum Bahasa Arab di Indonesia: Telaah Historis, Filosofis, dan Inovasi Terkini. LEARNING: Jurnal Inovasi Penelitian Pendidikan dan Pembelajaran.

- A. Safitri et al. (2025). Efektivitas Media Interaktif Berbasis Digital dalam Pembelajaran Bahasa Arab Untuk Siswa MI. Wulang: Jurnal Pendidikan Guru Madrasah Ibtidaiyah.
- A. Tarmizi et al. (2022). Tathwir Mawad al-Ta'bir al-Tahriry 'Ala Dhui Maharat al-Tafkir al-Ulya li Tarqiyah Kitabah al-Maqalah li Thullabah Qism Ta'lim al-Lughah al-Arabiyyah. Arabiyatuna: Jurnal Bahasa Arab.
- Achmad Makki Lazuardi et al. (2024). Enhancing Arabic Language Proficiency through Interactive Learning Programs. Lahjatuna: Jurnal Pendidikan Bahasa Arab.
- Adhi Nugraha et al. (2025). Curriculum Foundations for Arabic Language Education in the AI Era: Holistic, Juridical, and Technological Perspectives. Journal of Arabic Language Learning and Teaching (JALLT).
- Agus Ghulam Firza (2024). Conceptual Innovative Arabic Language Lesson Plan Based on 21st Century Skills. AURELIA: Jurnal Penelitian dan Pengabdian Masyarakat Indonesia.
- Ahmad Taufiq et al. (2023). Tahlil Ma'rifati al-Muhtawa al-Tiknulujiy al-Tarbawiy li Mu'allimi al-Lughah al-'Arabiyyah al-Mihniyyin fi Tatwir Adawat al-Ta'allum. Alsinatuna.
- Ahmad Ubaedi Fathuddin et al. (2025). Development of A Web-Based LMS To Enhance the Effectiveness of Arabic Language Learning at UIN K.H. Abdurrahman Wahid Pekalongan. Alsinatuna.
- Ahmadi et al. (2024). Digital Literacy Transformation in Madrasah Ibtidaiyah for Arabic Language Learning Through Adab and Tahfidz Programs with Technological Touch. Al-Bidayah: Jurnal Pendidikan Dasar Islam.
- Aini Nurazizah et al. (2026). Integration of Mobile Assisted Language Learning in Arabic Language Education: A Systematic Literature Review. Journal of Language and Literature Studies.
- Ainy Khairun Nisa et al. (2025). Integration of TPACK in the Implementation of Arabic Language Learning in the Digital Technology-Based Kurikulum Merdeka. Al-Ta'rib: Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya.
- Alsadika Ziaul Haq et al. (2024). Technology integration in arabic language learning: A literature review on the effectiveness of e-learning and mobile applications. Journal of Research in Instructional.
- Amami Shofiya Al Qorin et al. (2025). Designing Communicative-Based Arabic Learning Materials to Enhance 21st Century Skills of Students in Thailand. Journal of Arabic Language Studies and Teaching.

- Amrini Shofiyani (2025). Revitalization of KKNI-Based Arabic Language Curriculum in Higher Education. Scaffolding: Jurnal Pendidikan Islam dan Multikulturalisme.
- Aziz, M. T., Hasan, L. M. U., & Rido'i, M. (2024). Analisis Kurikulum Bahasa Arab Berbasis 4C (Critical Thinking, Communication, Collaboration, Creativity) untuk Pengembangan Kompetensi Abad 21 pada Siswa. DAARUS TSAQOFAH Jurnal Pendidikan Pascasarjana Universitas Qomaruddin, 2(1), 216-222. <https://doi.org/10.62740/jppuq.v2i1.258>
- Azwar Annas et al. (2025). Kurikulum Merdeka dan Relevansinya dalam Pembelajaran Bahasa Arab di Era Modern. el-Khuwailid: Journal of Multidisciplinary Studies.
- Bingxin Gu et al. (2024). Needs Analysis: Developing a Digital Literacy Integrated Speaking Syllabus for Arabic Pre-Service Teachers in China. Journal of Ecohumanism.
- Bingxin Gu et al. (2025). The Effectiveness of a Digital Literacy-Integrated Syllabus for Arabic-speaking Courses in Teacher Education Universities in China. Journal of Curriculum and Teaching.
- Bintang Parikesit et al. (2025). Development of Interactive Learning Media with InShot Application in Arabic Language Subjects. Arabiyatuna: Jurnal Bahasa Arab.
- Binti Mar'atul Muthongah et al. (2025). Developing Interactive Quizizz-Based Learning Media to Enhance Arabic Vocabulary and Grammar Skill. Al-Wazan: Journal of Arabic Education.
- Elok Fikril Hanik et al. (2025). Effectiveness Of Using Audio, Visual, And Multimedia Media in Arabic Language Learning in the Digital Era. IJIE International Journal of Islamic Education.
- Fadhil Izzan et al. (2025). Utilization of Learning Management System-Based Moodle and Google Classroom for Arabic Language Learning. Sustainable Jurnal Kajian Mutu Pendidikan.
- Fadlan Masykura Setiadi et al. (2025). Redesigning the ICT-Based Problem Based Learning (PBL) Model for Arabic Language Learning in Primary School: A Systematic Literature Review. ATHLA: Journal of Arabic Teaching, Linguistic and Literature.
- Fadlan Masykura Setiadi et al. (2026). Mandailing Local Wisdom-Based Arabic Teaching Materials for Critical Thinking in Islamic Higher Education. Alsina: Journal of Arabic Studies.

- Faiza Amaliyah et al. (2025). Integrating Digital Learning Tools into the Arabic Language Curriculum: Solutions and Success. *Journal of Practice Learning and Educational Development*.
- Farha Fuada et al. (2025). Trends of Gamification Tools in Teaching Arabic in the Era of Globalization: A Literature Review Study. *ATHLA: Journal of Arabic Teaching, Linguistic and Literature*.
- Fathor Rozi et al. (2021). Blended Learning Approach in Arabic Learning. *Journal of Physics: Conference Series*.
- Fatimah Azzahra Putri et al. (2026). Analisis desain kurikulum Bahasa Arab: Komponen dan Relevansi dengan Kebutuhan pembelajaran Abad ke-21. *Rayah Al-Islam*.
- Harfi Ade Febra Putra et al. (2026). Technology Integration in Arabic Language Curriculum from a TPACK Perspective: A Case Study in an Islamic State High School. *Borneo Journal of Language and Education*.
- Harmanto Raharjo et al. (2026). Readiness of Arabic Language Teachers to Integrate Large Language Models (LLMs) in their Teaching Practices: Challenges and Opportunities. *Arabiyatuna: Jurnal Bahasa Arab*.
- Ilham Nur Kholiq (2025). Kurikulum Berdaya Saing Bahasa Arab di Era Digital. *Edu Journal Innovation in Learning and Education*.
- Inass El-Khatib (2025). Linguistic Development in the Arabic Language Curriculum for the Intermediate Level in the Context of Blended Learning. *Dragoman Journal of Translation Studies*.
- Khabibatun Nisa' et al. (2026). Utilizing Blended Learning as an Innovation in Arabic Language Teaching Assessment in the Society 5.0 Era. *Jurnal Pembelajaran Bahasa dan Sastra*.
- Khasan Aedi et al. (2025). Development of the An-Nasr Mobile Application to Enhance Independent Learning Skills in Arabic Language Instruction. *Ta'lim al-'Arabiyyah: Jurnal Pendidikan Bahasa Arab & Kebahasaaraban*.
- Laili Mas Ulliyah Hasan et al. (2024). Menyelami Integrasi Kurikulum untuk Penerapan TPACK dalam Pembelajaran Bahasa Arab. *Journal of Practice Learning and Educational Development*.
- M. Anwar et al. (2025). Students' Critical Thinking Skills And Arabic Learning Outcomes Using Quizlet Media. *Ijaz Arabi Journal of Arabic Learning*.
- M. Habib (2025). Classroom Action Research on Digital Interactive Learning for Arabic Speaking Development in Islamic Junior High Schools. *Al-Muhawaroh: Jurnal Pendidikan Bahasa Arab*.

- M. Sarip et al. (2024). Integrated 6C Skills of the 21st Century with Animation Video Media for Arabic Speaking Material Design. *Jurnal Kependidikan*.
- Mahmoud Hela Abdel Baset Abdel Qader (2024). The Level of Inclusion of 21st Century Skills in the Content of the my Beautiful Language Curriculum in the Fifth Grade of Primary School. *Pakistan Journal of Life and Social Sciences (PJLSS)*.
- Mahmudi A. R. (2026). Membangun Budaya Literasi Digital Bahasa Arab melalui Platform E-Learning. *Multiverse: Open Multidisciplinary Journal*.
- Mahyudin Ritonga et al. (2024). Enhancing Arabic Language Learning in Higher Education: Leveraging E-Campus as an Online Learning and Evaluation Platform. *Jurnal Ilmiah Peuradeun*.
- Melisa Rezi et al. (2024). Utilization of Gamification in Arabic Language Learning to Increase Student Motivation and Achievement. *Lughawiyah: Journal of Arabic Education and Linguistics*.
- Meliza Budiarti et al. (2022). Padlet as a LMS Platform in Arabic Learning in Higher Education. *Ingénierie des systèmes d information*.
- Menik Mahmudah et al. (2026). A Multimodal Instructional Design Model. *International Journal of Arabic Language Teaching*.
- Mior Syazril Mohamed Sapawi et al. (2025). Integrating technology into the Arabic language curriculum: A systematic review of trends, strategies and cultural dimensions. *Social Sciences & Humanities Open*.
- Moh. Ismail et al. (2023). The Impact of Learning Management System 'arabi.id' Web-Based Application on Developing Arabic Language Skills. *Al-Ta'rib: Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya*.
- Mohammad Ahsanuddin et al. (2025). The Effectiveness Gamification as an Assessment Method to Enhance Arabic Language Learning Competency in Indonesian Junior High Schools. *Forum for Linguistic Studies*.
- Mohammad Taufiq Abdul Ghani et al. (2022). The Impact of Mobile Digital Game in Learning Arabic Language at Tertiary Level. *Contemporary Educational Technology*.
- Mohd Amran Bin Jaafar et al. (2022). Experimental Study of The Effectiveness of Gamification Module for Arabic Language in Primary School. *International Journal of Academic Research in Business and Social Sciences*.
- Muflihah et al. (2025). Management of Developing Interactive Multimedia-Based Arabic Teaching Materials: Enhancing Learning for Diverse Students at Indonesian Islamic Universities. *Munaddhomah: Jurnal Manajemen Pendidikan Islam*.

- Muhammad Abdun Jamil et al. (2024). Integration of Technology in Arabic Language Pedagogy: Challenges and Opportunities for Modern Curriculum Development. *Lughawiyah: Journal of Arabic Education and Linguistics*.
- Muhammad Ediyani et al. (2025). Redefining Arabic Teacher Competencies for Digital Learning: A Conceptual Review Based on TPACK and DigCompEdu. *Referensi Islamika: Jurnal Studi Islam*.
- Muhyidin Yahya et al. (2021). Online-Based Arabic Learning Management During the Covid-19 Pandemic Era: Plan, Implementation and Evaluation. *Al-Ta'rib: Jurnal Ilmiah Program Studi Pendidikan Bahasa Arab IAIN Palangka Raya*.
- Mustafa Jwaifell et al. (2018). The Readiness of Arabic Language Teachers for Integrating Flipped Classroom: Case of Ma'an. *International Journal of Instruction*.
- N. Rahmawati (2024). Development of interactive digital teaching materials based on 21st century skills in special purpose arabic language courses at STAI Attanwir Bojonegoro. *At-Ta'lim: Jurnal Pendidikan*.
- N. Siregar et al. (2025). Integrating Digital Platforms to Enhance Arabic Language Learning in Islamic Higher Education. *Journal of Educational Analytics*.
- Naifah et al. (2025). The Development of a Digital Module on the Concept and Application of the Kurikulum Merdeka in Madrasas Based on Problem-Based Learning. *Arabiyatuna: Jurnal Bahasa Arab*.
- Noor Zinatul Hamidah et al. (2024). Arabic Learning Design Using an Alef Education Platform-Based Blended Learning Model: Jared M. Carman Perspective. *Izdihar: Journal of Arabic Language Teaching, Linguistics, and Literature*.
- Nur Azizah et al. (2025). Digital Transformation in Islamic Education: Curriculum Merdeka-Based Learning Strategies to Enhance Student Autonomy and Innovation. *AL-ADABIYAH: Jurnal Pendidikan Agama Islam*.
- Putri Kholida Faiqoh et al. (2025). Digital Media and Technology in Arabic Language Learning. *Journal of Arabic Language Teaching*.
- R. Amalia et al. (2025). Transformasi Pendekatan Guru Bahasa Arab MTsN 35 Jakarta dalam Menghadapi Kompleksitas Kurikulum Merdeka. *Ta'limi: Journal of Arabic Education and Arabic Studies*.
- R. Taufiqurrochman et al. (2020). Students' Perceptions on Learning Management Systems of Arabic Learning through Blended Learning Model. *Jurnal Al-Bayan: Jurnal Jurusan Pendidikan Bahasa Arab*.

- Rifda Haniefa et al. (2023). Penerapan Technological Pedagogical and Content Knowledge (TPACK) dalam Pengajaran Keterampilan Berbahasa Arab. *Ta'limi: Journal of Arabic Education and Arabic Studies*.
- Rosli Hady et al. (2025). The Revolution of Arabic Language Learning: Integration of Digital Technology in 21st Century Education. *Jurnal Ilmiah Profesi Pendidikan*.
- Ruby Syahira et al. (2026). Development of Kalam Flipbook Media for Arabic Speaking Skills of Students Grade X Madrasah Aliyah in Semarang City. *Arabiyatuna: Jurnal Bahasa Arab*.
- S. O. Makinde et al. (2024). Proposal to Develop and Validate a Moodle-Based Flipped Learning Platform for Enhancing Arabic Communication Skills. *IJIET (International Journal of Indonesian Education and Teaching)*.
- Salma Hayati et al. (2025). Creativity of Arabic Language Education Students in Designing Teaching Materials: A Project-Based Approach in the Tathwir Mawaad Course for ALF Learners. *EDUKASIA Jurnal Pendidikan dan Pembelajaran*.
- Sameer M. Alnajdi (2017). Design a Blended Learning Environment to Teach Arabic Alphabet for Non-Arabic Speaker Children Based on ASSURE Model. *International Journal of Information and Education Technology*.
- Samsuar Arani et al. (2024). Inovasi Blended Learning Dalam Pembelajaran Bahasa Arab: Tantangan dan Peluang di Era Society 5.0. *LISANUNA: Jurnal Ilmu Bahasa Arab dan Pembelajarannya*.
- Sarah Sarah et al. (2024). Technology Integration in Arabic Language Skills Development in the Digital Era. *Al-Fusha: Arabic Language Education Journal*.
- Shofwan Sholahudin et al. (2025). The Competence of Arabic Language Teachers in The Digital Era: A Study Based on The TPACK Framework. *Dinasti International Journal of Education Management And Social Science*.
- Sugino Sugino et al. (2025). Metode Task-Based, Communicative, dan ICT dalam Pembelajaran Bahasa Arab. *INCARE, International Journal of Educational Resources*.
- Sultan A. Almelhes (2024). Gamification for teaching the Arabic language to non-native speakers: a systematic literature review. *Frontiers in Education*.
- Susanto et al. (2022). Arabic Learning Design Based on 21st Century Skills during the Covid-19 Pandemic in Indonesia. *Jurnal Iqra': Kajian Ilmu Pendidikan*.
- Syamfa Agny Anggara & Afif Kholisun Nashoihi (2025). Technology and Media in Arabic Language Learning. *JIPI (Jurnal Ilmiah Pendidikan Islam)*.

- T. Mohammed et al. (2021). Towards a Blended Programme for Arabic and Other Less Commonly Taught Languages (LCTLs) in the South African Higher Education Context. *Education Research International*.
- U. Hanifah et al. (2024). Accelerating the digitalisation of learning post-COVID-19 era to improve the pedagogical competence of pre-service Arabic teachers. *Cogent Education*.
- Umami Syarah Ismail et al. (2023). A Model Framework for the Implementation of Gamification in Arabic Teaching in Malaysia. *Theory and Practice in Language Studies*.
- Y. Suryadarma et al. (2025). The Concept of Interactive Arabic Learning Media Uses the First-Person Shooter Gamification Method. *Salud, Ciencia y Tecnología - Serie de Conferencias*.
- Yayah Robiatul Adawiyah et al. (2025). A 4Cs-Based Framework for Arabic Language Curriculum to Improve Students' Linguistic Competence. *Journal of English Language and Education*.
- Yuli Susanti et al. (2023). Development of a Liveworksheet Application to Create Online Interactive Materials and LKS in Arabic Lessons at Senior High School. *Journal International Inspire Education Technology*.
- Z. EdyMurdani et al. (2021). Critical Reading Material Development based on Quran for Arabic Student. *Dinamika Ilmu*.