

Developing Productive and Creative Language Skills in the Era of Digital Applications and Artificial Intelligence: Evidence from Brunei Darussalam.

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Abstract

The rapid integration of digital applications and artificial intelligence (AI) has fundamentally transformed contemporary language education, particularly in relation to the development of productive and creative language skills. This study examines the pedagogical potentials, limitations, and emerging trajectories of AI-enhanced learning environments in fostering speaking and writing skills among learners of Arabic in Brunei Darussalam. Employing a descriptive-analytical library-based research design within an interpretive qualitative paradigm, the study conducts systematic content analysis of theoretical frameworks, empirical studies, and relevant policy documents on technology-enhanced language learning and artificial intelligence in education. The findings indicate that AI-supported tools—including automated writing evaluation, generative language models, speech recognition systems, and digital storytelling platforms—have become structurally transformative rather than supplementary when embedded within pedagogically guided and ethically regulated frameworks. These tools enhance linguistic accuracy, textual coherence, oral fluency, learner autonomy, and creative expression. However, the study also identifies critical pedagogical and ethical risks associated with unregulated AI use, including reduced cognitive engagement, erosion of originality, threats to academic integrity, and data-privacy concerns. Situated within Brunei's multilingual and digitally progressive educational context, the study concludes that the sustainable future of Arabic in the digital age depends on pedagogical design, institutional vision, and ethical governance rather than technological advancement alone.

Keywords: Artificial intelligence, language education, Brunei Darussalam

1. Introduction

The rapid expansion of digital technologies and artificial intelligence (AI) has fundamentally reshaped contemporary language education, introducing new pedagogical affordances alongside complex ethical and epistemological challenges. Intelligent learning systems—ranging from adaptive platforms and automated feedback tools to generative language models—have transformed how languages are taught, learned, and assessed, particularly in relation to productive skills such as speaking and writing (Holmes et al., 2022, pp. 97–101; OECD, 2023, p. 14). These skills occupy a central position in second language acquisition (SLA), as they represent learners' ability to convert linguistic knowledge into meaningful communicative and creative output. From a communicative and sociocognitive perspective, productive language use is not merely an outcome of learning but a core mechanism driving linguistic development. The Output Hypothesis emphasizes that speaking and writing prompt learners to notice gaps in their interlanguage, test hypotheses, and refine form–meaning relationships, thereby facilitating durable acquisition (Swain, 2005, pp. 471–475; Ellis, 2008, pp. 85–89). Creativity further enriches productive competence by enabling learners to deploy linguistic resources flexibly and innovatively across diverse communicative contexts and modalities (Larsen-Freeman, 2011, pp. 56–59; Richards, 2013, pp. 20–23).

In recent years, digital applications and AI-driven tools have been increasingly mobilized to support these productive and creative dimensions of language learning. Empirical studies indicate that automated writing evaluation (AWE), speech recognition systems, and multimodal platforms can enhance accuracy, fluency, learner autonomy, and engagement when pedagogically mediated (Weigle, 2014, pp. 43–45; Derwing & Munro, 2015, pp. 87–90; Ranalli et al., 2017, pp. 78–82). Generative AI has further reinforced personalized learning paradigms by adapting linguistic support to learners' proficiency levels, error patterns, and learning pace, thereby strengthening motivation and self-regulated learning (Oxford, 2017, pp. 45–48). Despite these affordances, the literature cautions against uncritical adoption of AI in language education. Excessive reliance on automated systems may undermine critical thinking, originality, and learners' sense of linguistic ownership, transforming AI from a pedagogical scaffold into a cognitive substitute (Dörnyei, 2005, pp. 213–215; Carr, 2011, pp. 120–123; Zhai, 2023, pp. 98–101). These concerns have intensified calls for ethically grounded, human-centred frameworks governing AI use, particularly with respect to academic integrity, data privacy, and creative authenticity (UNESCO, 2021, pp. 31–33; British Council, 2023, pp. 12–16).

Within Arabic language education, these issues are especially salient. Arabic's morphological richness and diglossic nature pose long-standing challenges for the development of productive skills, challenges historically compounded by form-focused pedagogy and limited opportunities for authentic communication (Al-Batal, 2017, pp. 389–393). While global research on AI-assisted language learning has expanded rapidly, empirical studies focusing on Arabic—particularly within Southeast Asian contexts—remain limited.

Brunei Darussalam offers a strategically significant yet underexplored context for addressing this gap. Although Arabic is not the country's primary official language, it holds a central position in religious and higher education, while national policies strongly emphasize digital transformation, multilingual competence, and sustainable innovation (Ministry of Education, Brunei Darussalam, 2022, pp. 7–12; UNESCO, 2023, pp. 19–23). Against this backdrop, the present study investigates the potentials, limitations, and emerging trends associated with integrating digital applications and artificial intelligence into the development of productive and creative Arabic language skills in Brunei Darussalam, contributing a theoretically grounded and context-responsive perspective to the evolving field of AI-enhanced language education.

2. Literature Review

Productive language skills—speaking and writing—constitute a central mechanism in second language acquisition (SLA), as they enable learners to externalize linguistic knowledge through meaningful communicative output. From communicative and sociocognitive perspectives, production is not merely an outcome of learning but a driving force that promotes noticing, hypothesis testing, and refinement of interlanguage systems (Swain, 2005, pp. 471–475; Ellis, 2008, pp. 85–89). Creativity further enriches productive competence by allowing learners to deploy linguistic resources flexibly and innovatively across communicative contexts (Larsen-Freeman, 2011, pp. 56–59; Richards, 2013, pp. 20–23). In Arabic language education, however, the development of productive and creative skills has long been constrained by form-centred instruction, limited authentic communicative practice, and assessment traditions privileging receptive knowledge over performance. These structural limitations have generated sustained calls for pedagogical renewal grounded in communicative, task-based, and technology-enhanced approaches capable of repositioning Arabic as a language of active production (Al-Batal, 2017, pp. 389–393).

Technology-enhanced language learning (TELL) has substantially reshaped the conditions under which productive skills are cultivated. Digital environments expand learning beyond classroom boundaries, support multimodal meaning-making, and enable sustained practice through interactive and learner-centred platforms (Chapelle, 2009, pp. 741–744; Warschauer & Healey, 1998, pp. 63–66). Empirical studies consistently report that digital tools increase learner engagement, output opportunities, and linguistic accuracy, while fostering expressive depth through multimodal composition (Godwin-Jones, 2018, pp. 9–13; Kress, 2010, pp. 79–83).

Among digital practices, digital storytelling has emerged as a powerful pedagogical medium for creative language use. By integrating text, audio, imagery, and movement, digital storytelling supports narrative competence, oral fluency, and learner confidence, while reducing affective barriers to speaking (Robin, 2016, pp. 18–21; Macleroy, 2021, pp. 34–39). Research across diverse language contexts indicates that learners engaged in digital storytelling demonstrate higher motivation, greater ownership of language, and improved coherence in spoken and written discourse (Chao, 2013, pp. 512–519).

The emergence of artificial intelligence has further transformed language education by enabling adaptive, data-driven learning environments. AI-powered systems—such as automated writing evaluation (AWE), speech recognition, and generative language models—provide real-time feedback, individualized scaffolding, and iterative revision opportunities at scale (Baker & Smith, 2019, pp. 6–9; Holmes et al., 2022, pp. 97–101). In writing instruction, AWE tools have been shown to enhance grammatical accuracy, lexical choice, and textual coherence when combined with pedagogical mediation (Weigle, 2014, pp. 43–45; Ranalli et al., 2017, pp. 78–82). Similarly, AI-supported pronunciation technologies address long-standing challenges in L2 speech development through repeated practice and phonological awareness training (Derwing & Munro, 2015, pp. 87–90).

Nevertheless, the literature consistently cautions that the pedagogical value of AI is contingent upon intentional design and ethical governance. Excessive reliance on automated systems risks diminishing critical thinking, originality, and linguistic ownership, transforming AI from a learning scaffold into a cognitive substitute (Dörnyei, 2005, pp. 213–215; Carr, 2011, pp. 120–123). Consequently, concerns regarding academic integrity, data privacy, and creative erosion have prompted calls for human-centred and ethically regulated AI integration in education (Zhai, 2023, pp. 98–101; Sharadgah & Sa'di, 2022, pp. 58–61; UNESCO, 2021, pp. 31–33).

Within Brunei Darussalam, Arabic language education operates within a multilingual ecosystem shaped by Malay and English dominance, yet supported by strong national commitments to digital transformation. While policy frameworks provide favourable conditions for innovation, empirical research examining AI-supported development of Arabic productive and creative skills remains limited. This study addresses this gap by synthesizing global scholarship with contextual and institutional analysis, offering a theoretically grounded and context-responsive perspective on AI-enhanced Arabic language education in Brunei Darussalam.

3. Research Methodology

This study adopts a descriptive–analytical library-based research design, grounded in a systematic examination of theoretical constructs, conceptual models, and empirical evidence related to the development of productive (speaking and writing) and creative language skills in the context of digital applications and artificial intelligence (AI). The methodological approach is complemented by qualitative content analysis, enabling an in-depth and structured interpretation of empirical studies, systematic reviews, and official policy documents relevant to Arabic language education in digitally mediated learning environments (Creswell & Poth, 2018, pp. 82–85; Merriam & Tisdell, 2016, pp. 94–98).

3.1. Research Design and Analytical Framework

The study is situated within an interpretive qualitative paradigm, which is particularly appropriate for exploring evolving educational phenomena shaped by technological innovation, institutional policy, and pedagogical transformation. Rather than seeking statistical generalization, the research aims to generate analytical generalization through conceptual synthesis and comparative interpretation of established scholarly works (Yin, 2018, pp. 15–18).

To achieve this objective, the study integrates three complementary methodological strands:

- Theoretical Analysis, focusing on linguistic productivity, creativity, communicative competence, and technology-enhanced language learning frameworks;
- Systematic Content Analysis, applied to peer-reviewed empirical studies, meta-analyses, and institutional reports;
- Contextual Analysis, examining the specific educational, linguistic, and policy environment of Brunei Darussalam, with particular attention to Sultan Sharif Ali Islamic University (UNISSA).

This triangulated approach strengthens methodological validity and allows for a holistic understanding of Arabic language education under contemporary digital transformation (Miles, Huberman, & Saldaña, 2020, pp. 8–12).

3.2. Data Sources and Selection Criteria

Data were collected through an extensive review of high-quality academic sources, including:

- Peer-reviewed journals indexed in Scopus and Web of Science (e.g., *System*, *Computer Assisted Language Learning*, *ReCALL*, *Language Learning & Technology*);
- Authoritative international and national policy documents (e.g., UNESCO, OECD, Ministry of Education of Brunei Darussalam);
- Scholarly monographs addressing second language acquisition, communicative language teaching, digital pedagogy, and artificial intelligence in education.

The selection process followed clearly defined inclusion criteria, prioritizing:

- Conceptual relevance to productive and creative language skills;
- Methodological rigor and empirical credibility;
- Contemporary relevance (primarily publications from 2015 onward);
- Explicit engagement with digital technologies, AI, or language sustainability.
- Key search terms included productive language skills, creative language learning, artificial intelligence in language education, digital storytelling, automated writing evaluation, Arabic language teaching, and AI-driven pronunciation training.

3.3. Analytical Procedures

The analytical process proceeded through several iterative stages:

- a. Identification and coding of core themes, including:
 - The pedagogical potential of digital applications and AI in enhancing productive and creative skills;
 - Pedagogical, ethical, and epistemic challenges associated with AI integration;
 - Contextual specificities of Arabic language education in Brunei Darussalam;
 - Institutional contributions of UNISSA to Arabic linguistic sustainability through AI-enabled initiatives;
 - The development of generative AI governance frameworks in higher education;
 - The design and evaluation of AI-based Arabic speech recognition models for phonemic error analysis;
 - Pedagogical innovation through technology-integrated instructional materials, particularly the textbook *Communicative Arabic for Non-Native Speakers*;
 - The construction of an integrative conceptual framework for developing productive and creative skills in Arabic education.
- b. Comparative thematic synthesis, whereby findings across studies were systematically compared to identify convergences, divergences, and emerging trends (Braun & Clarke, 2021, pp. 330–334).

- c. Interpretive integration, linking empirical findings to established theoretical perspectives in second language acquisition, communicative language teaching, and technology-enhanced learning.

3.4. Methodological Contribution

By combining descriptive-analytical inquiry with qualitative content analysis, this study offers a methodologically robust and conceptually integrative approach to examining Arabic language education in the age of digitalization and artificial intelligence. The methodology enables the articulation of evidence-based insights while remaining sensitive to contextual and institutional dynamics.

Moreover, the approach supports the development of a context-responsive conceptual framework, grounded in international scholarship yet tailored to the linguistic, cultural, and educational realities of Brunei Darussalam. This methodological orientation aligns with contemporary calls for contextually situated research in applied linguistics and educational technology (Chapelle, 2020, pp. 45–48; Selwyn, 2022, pp. 55–57).

4. Results and Discussion

This study aims to investigate the potentials, limitations, and overarching trends that emerge from the integration of digital applications and artificial intelligence (AI) in the development of productive language skills—specifically speaking and writing—and creative capacities among learners of Arabic in Brunei Darussalam. Through systematic qualitative analysis and critical synthesis of contemporary literature and empirical findings, the study identifies eight interrelated thematic dimensions that collectively contribute to a comprehensive understanding of the future of Arabic language education within the context of global digital transformation.

4.1. The Potential of Digital Applications and Artificial Intelligence in Developing Productive and Creative Language Skills

Findings from recent systematic reviews and experimental studies reveal substantial and empirically validated potential for digital applications and AI-based tools in enhancing linguistic production and fostering learner creativity. Within the growing shift toward hybrid learning environments that combine face-to-face instruction with digital platforms, these technologies offer unprecedented opportunities to extend learners' exposure to Arabic through multimodal channels, including interactive applications, intelligent learning platforms, and natural language processing (NLP) technologies.

Contemporary research suggests that these tools do not merely provide supplementary linguistic input; rather, they significantly enhance the quality, immediacy, and precision of feedback. Learners receive real-time and individualized evaluations of pronunciation accuracy, syntactic structure, lexical selection, and textual coherence, thereby accelerating the learning cycle and supporting self-regulated learning processes (Kristiawan et al., 2024, pp. 210–216; Li & Lan, 2023, pp. 88–92). Empirical evidence further demonstrates that learners who utilize AI-based writing correction systems show marked improvement in conceptual clarity, grammatical accuracy, and the ability to revise and restructure texts in a more coherent and stylistically refined manner (Jaramillo et al., 2025, pp. 10–16; Ranalli et al., 2017, pp. 78–82).

In parallel, research on language education in the digital age highlights the pedagogical value of digital storytelling as a powerful medium for creative expression. By integrating sound, image, text, and movement, digital storytelling enables learners to construct authentic Arabic narratives through voice recording, animation, and short video production. These practices enhance oral fluency, strengthen learners' confidence in speaking, and support spontaneous verbal expression within psychologically safe learning environments (Macleroy, 2021, pp. 34–39; Chao, 2013, pp. 512–519; Robin, 2016, pp. 18–21).

Generative AI technologies have also reinforced the paradigm of personalized learning, whereby learners receive adaptive linguistic support tailored to their proficiency levels, error patterns, and learning pace. Such personalization has been shown to enhance intrinsic motivation, learner autonomy, and sustained engagement—key predictors of successful language acquisition (Oxford, 2017, pp. 45–48; *Learning Languages in the 21st Century*, 2024).

Furthermore, Automated Writing Evaluation (AWE) tools represent a qualitative advancement in Arabic text production. These systems facilitate rapid identification of weaknesses, suggest alternative linguistic formulations, and support iterative cycles of drafting and revision, thereby promoting continuous improvement in writing performance (Rahman et al., 2022, pp. 133–137; Hamid, 2025, pp. 61–65; Weigle, 2014, pp. 43–45).

Taken together, these findings indicate that digital applications and AI technologies offer meaningful opportunities for the expansion and revitalization of Arabic language education, provided that their integration is guided by a pedagogically sound framework that balances technological innovation with human mediation and creative agency.

4.2. Pedagogical and Ethical Challenges

Despite the considerable affordances of AI, the literature identifies a set of critical pedagogical and ethical challenges that require sustained institutional and instructional vigilance. Foremost among these is the risk of excessive reliance on AI-driven tools. Empirical studies warn that unregulated use of intelligent applications may reduce learners' cognitive engagement, weaken critical thinking skills, and diminish their capacity for independent analysis and original expression (Hern, 2025; Lee et al., 2023, pp. 402–406; Carr, 2011, pp. 120–123).

Another major concern involves the potential erosion of creativity. Overreliance on generative text tools may undermine learners' ability to make nuanced linguistic choices, construct syntactic patterns, develop rhetorical imagery, and generate original ideas. Recent scholarship describes this phenomenon as “creative outsourcing,” whereby learners delegate core cognitive processes to AI systems, resulting in superficial learning outcomes (Zhai, 2023, pp. 98–101; Sharadgah & Sa'di, 2022, pp. 58–61).

Digital security and data privacy also constitute pressing challenges, particularly regarding the collection, storage, and processing of learners' personal data on cloud-based platforms and AI systems. Scholars have highlighted the absence of robust regulatory safeguards in many widely adopted educational applications, raising concerns about data misuse and ethical accountability (Kutsyk & Nykyporets, 2024, pp. 211–215; Selwyn, 2022, pp. 55–57).

Academic integrity represents an additional area of concern, as educational institutions increasingly struggle to detect plagiarism, inappropriate AI use, and unacknowledged automated text generation. These challenges have been extensively documented in recent British Council reports on artificial intelligence and education (British Council, 2023, pp. 12–16).

Collectively, these challenges underscore the risks of allowing digital learning environments to operate without a coherent governance framework. Accordingly, there is a pressing need for a comprehensive ethical architecture encompassing national policies, institutional guidelines, and robust assessment mechanisms to ensure the responsible and transparent use of intelligent technologies.

4.3. The Specificity of the Bruneian Context and Its Implications for Arabic Language Education

Official policy documents issued by the Ministry of Education of Brunei Darussalam reflect a strong national commitment to digital transformation in education, as articulated in the Digital Transformation Plan (2023–2027), which emphasizes the development of twenty-first-century competencies, including digital literacy and multilingual communication skills (Ministry of Education, Brunei Darussalam, 2022, pp. 7–12). UNESCO reports further confirm that Brunei prioritizes digital innovation across all levels of education as a cornerstone of sustainable development (UNESCO, 2023, pp. 19–23).

Although Arabic is not Brunei's primary official language, it occupies a central position in religious and higher education, particularly within Islamic universities. Field-based observations and institutional reports indicate that Bruneian students demonstrate high levels of engagement with digital projects, especially those involving digital storytelling, multimedia production, and interactive learning environments (Macleroy, 2021; Robin, 2016).

These contextual factors present significant opportunities for integrating Arabic into Brunei's dynamic digital ecosystem through Arabic digital storytelling projects, digital awareness campaigns, and creative instructional materials that promote productive language skills. Moreover, Brunei's multilingual environment—encompassing Malay, Arabic, and English—predisposes learners to flexible cross-linguistic transfer, thereby facilitating multimodal language learning (Cenoz & Gorter, 2017, pp. 113–116).

Overall, the analysis suggests that Arabic language education in Brunei stands at a critical juncture, with strong potential for alignment with the national digital transformation agenda, provided that curricular renewal, pedagogical innovation, and assessment reform are pursued strategically to reposition Arabic as a language of production and creativity rather than rote memorization.

4.4. Sultan Sharif Ali Islamic University (UNISSA) and Arabic Linguistic Sustainability through Artificial Intelligence

Findings from a qualitative interpretive study conducted at Sultan Sharif Ali Islamic University in 2025—based on semi-structured interviews with 38 students enrolled in Arabic-track programmes—reveal profound structural transformations in Arabic language learning within AI-mediated educational environments.

The data indicate that AI has become a central catalyst in enhancing the four core language skills through semantic summarization, vocabulary scaffolding, guided auditory repetition, immediate feedback, and generative grammatical analysis. These findings align closely with Jamaludin's (2020, pp. 145–148) research on AI-supported reading, Vandergrift's (2007, pp. 191–193) metacognitive model of listening, Derwing and Munro's (2015, pp. 87–90) work on pronunciation pedagogy, and Weigle's (2014, pp. 43–45) framework for writing assessment. Learners also demonstrated notable cognitive and grammatical development facilitated by AI-enabled visualizations and contextualized applications, supporting Larsen-Freeman's (2003, pp. 102–105) conceptualization of grammar as a dynamic system rather than static knowledge.

Importantly, AI emerged as a strategic driver of Arabic linguistic sustainability within the university by expanding Arabic's digital presence, enabling flexible self-directed learning resources, and fostering continuous learning pathways. This trajectory aligns with UNESCO's (2023, pp. 27–29) vision of AI as a catalyst for language preservation and sustainability in digital spaces.

At the same time, the findings highlight risks associated with excessive reliance on AI, including reduced intrinsic motivation and weakened critical thinking skills—concerns previously articulated by Dörnyei (2005, pp. 213–215) and Carr (2011, pp. 120–123)

5. Conclusion

This study examined the pedagogical potentials, limitations, and emerging trajectories of integrating digital applications and artificial intelligence (AI) into the development of productive (speaking and writing) and creative language skills among learners of Arabic in Brunei Darussalam. Through qualitative descriptive-analytical synthesis, the findings demonstrate that AI-enhanced learning environments have become structurally transformative rather than supplementary, reshaping linguistic production, learner engagement, and instructional design. The analysis confirms that AI-supported tools—such as automated writing evaluation, generative language models, and digital storytelling platforms—significantly enhance linguistic accuracy, textual coherence, oral fluency, and creative expression when embedded within pedagogically guided, learner-centred frameworks. These affordances align with contemporary perspectives on communicative competence, self-regulated learning, and dynamic language systems, indicating that technology can amplify human linguistic agency rather than replace it. Nevertheless, the study also identifies critical pedagogical and ethical risks associated with unregulated AI use, including diminished cognitive engagement, erosion of creative originality, threats to academic integrity, and data-privacy concerns. These findings underscore the necessity of robust ethical governance and pedagogical mediation.

Within the Bruneian context, national digital transformation policies, multilingual sociolinguistic conditions, and institutional innovation—particularly at Sultan Sharif Ali Islamic University (UNISSA)—create favorable conditions for repositioning Arabic as a language of production, creativity, and digital presence. Ultimately, the study concludes that the future sustainability of Arabic in the digital age depends not on technological advancement alone, but on the quality of pedagogical design, institutional vision, and ethical regulation guiding AI integration.

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