

Redefining Language Education in the Age of AI: Digital Pedagogy and the Evolving Role of Teachers in Multilingual University Contexts

إعادة تعريف تعليم اللغات في عصر الذكاء الاصطناعي: البيداغوجيا الرقمية والدور المتطور للمعلمين في سياقات الجامعات متعددة اللغات

Lilia LAMRAOUI

Badji Mokhtar - Annaba University, Algeria, lilia.lamraoui@univ-annaba.dz

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Abstract

This article examines how artificial intelligence (AI) and digital pedagogy are reshaping university language teaching in multilingual contexts, with a focus on Algerian Master's programs in translation and interpreting. It outlines a theoretical framework connecting AI (machine learning, natural language processing) and digital pedagogy (interactivity, personalization, accessibility) to the specific challenges of multilingual higher education. Drawing on a case study of Master 1 students enrolled in Simultaneous Interpreting and Consecutive Interpreting modules at Badji Mokhtar Annaba University in 2024–2025, the study demonstrates how AI tools such as DeepL Voice, Microsoft Translator, QuillBot, and the European Commission's Speech Repository support personalization, collaboration, and multilingual scaffolding, while shifting the teacher's role from knowledge provider to facilitator and ethical mediator. The analysis highlights increased learner engagement, autonomy, and perceived proficiency, alongside persistent issues of digital inequality, algorithmic bias, data privacy, and teacher training. The article proposes pedagogical and institutional recommendations and calls for longitudinal, context sensitive research on teacher identity, student perceptions, and responsible AI governance in multilingual university settings.

Keywords: Artificial intelligence; Digital pedagogy; Interpreter training; Multilingual education; Higher education.

ملخص

نبحث في هذا المقال كيفية إعادة تشكيل الذكاء الاصطناعي والبيداغوجيا الرقمية لتعليم اللغات في الجامعة ضمن سياقات متعددة اللغات، مع التركيز على برامج الماستر الجزائرية في الترجمة. نعرض إطارا نظريا يربط بين تقنيات الذكاء الاصطناعي

(التعلّم الآلي، معالجة اللغة الطبيعية) ومبادئ البيداغوجيا الرقمية (التفاعلية، التفريد، الإتاحة) والتحديات الخاصة بالتعليم العالي المتعدد اللغات. بالاستناد إلى دراسة حالة لطلبة الماستر 1 المسجلين في مادتي «الترجمة الفورية» و«الترجمة التتابعية» بجامعة باجي مختار عنابة خلال السنة الجامعية 2025/2024، توضّح الدراسة كيف تدعم أدوات الذكاء الاصطناعي مثل DeepL Voice وMicrosoft Translator وQuillBot و«مستودع الخطب» التابع للمفوضية الأوروبية التفريد، والتعلّم التعاوني، والدعم متعدّد اللغات، مع إعادة تشكيل دور المعلّم من ناقل للمعرفة إلى ميسّر ووسيط أخلاقي. تبرز النتائج ارتفاع مستوى اندماج المتعلمين ودرجة الاستقلالية والكفاءة المدركة، مقابل استمرار مشكلات عدم المساواة الرقمية، والانحياز الخوارزمي، وخصوصية البيانات، والحاجة إلى تكوين المدرّسين. وتقدّم المقالة جملة من التوصيات البيداغوجية والمؤسسية، مع الدعوة إلى أبحاث طويلة تراعي الخصوصية السياقية حول هوية المعلّم، وتمثّلات الطلبة، وحوكمة الذكاء الاصطناعي في البيئات الجامعية المتعددة اللغات.

كلمات مفتاحية: الذكاء الاصطناعي؛ البيداغوجيا الرقمية؛ تكوين الترجمانيين؛ التعليم المتعدد اللغات؛ التعليم العالي..

1. Introduction

The integration of artificial intelligence (AI) and digital pedagogy into university language teaching represents a pivotal shift in the contemporary educational landscape (ECML, 2024; Warschauer & Liaw, 2019). This shift is marked by innovative practices and a reconfiguration of the educator's role, particularly in multilingual contexts. This transformation is driven by a growing awareness of students' diverse linguistic backgrounds and the consequent need to design pedagogical approaches that are responsive to such diversity (García & Flores, 2022). As universities increasingly embrace technological innovation, the synergy between AI, digital tools, and language instruction offers new possibilities for addressing the complexities of learning in a globalized, multilingual environment (Godwin-Jones, 2023). In the Algerian higher education context, this shift is especially visible in Master's programs in translation and interpreting, where large cohorts and heterogeneous linguistic profiles require carefully mediated integration of AI-enhanced digital platforms (Benrabah, 2013; Lo Bianco, 2020). Drawing on experience from two Master 1 modules, Simultaneous Interpreting and Consecutive Interpreting, this article examines how AI and digital pedagogy reshape the teacher's role and learning dynamics in such settings.

2. Theoretical Framework: AI and Digital Pedagogy in Multilingual Higher Education

Artificial intelligence has emerged as a transformative force in university language teaching (Golub et al., 2023; Zawacki-Richter et al., 2019). Through machine learning and natural language processing (NLP), AI enables adaptive and personalized learning experiences that respond to individual learner profiles (Jia et al., 2023; Li, 2024). These tools not only promote linguistic competence but also encourage learners to engage in authentic communicative practices (Reinhardt, 2020). In multilingual contexts, AI-driven platforms address the challenges of diverse student populations by supporting the development of native-language resources and scaffolds, thereby enhancing comprehension and retention (Lo Bianco, 2020; García & Flores, 2022).

Digital pedagogy complements AI by incorporating multimedia resources and collaborative platforms that enrich the language acquisition process (Bates, 2019; Başaran, 2025). Innovative strategies such as gamification, virtual reality, and online collaborative projects engage students in immersive scenarios that approximate real-world communication (Deterding, 2017; Lan, 2020; Godwin-Jones, 2023). The infusion of AI technologies into university language education thus heralds a new era in which innovative practices are not only possible but necessary, particularly in multilingual

higher education (Holmes et al., 2022; ECML, 2024). Teachers must therefore combine technological, pedagogical, and intercultural expertise to design inclusive learning environments (García & Flores, 2022; Tynny & Schukina, 2025). In such settings, educators can draw on a wide range of multimedia resources—videos, interactive exercises, and collaborative documents—to promote deeper cognitive engagement (Reinhardt, 2020). This blended approach not only fosters greater inclusivity but also extends learning opportunities beyond the physical classroom, accommodating diverse schedules and connectivity constraints (Bates, 2019; Başaran, 2025).

3. The Reconfigured Role of the Educator: Facilitation and Ethics

The integration of AI catalyzes a shift toward learner-centered pedagogies in university language teaching (Holmes et al., 2022; Zawacki-Richter et al., 2019). Adaptive technologies assess learners' progress in real time, allowing educators to adjust instructional strategies and feedback (Zaim et al., 2024). This move away from one-size-fits-all teaching encourages autonomy and self-regulation, thus redefining the conventional role of the teacher (Holmes et al., 2022). As facilitators rather than mere disseminators, educators orchestrate dynamic environments in which technology underpins individualized learning paths.

Educators therefore need to adopt a critical stance toward technology, fostering critical digital literacy and guiding learners toward ethical engagement with digital environments (Rheingold, 2012; Crompton et al., 2024). The interaction between AI and pedagogy also poses challenges, as highly automated systems may unintentionally sideline affective and relational dimensions of teaching (White, 2014). Consequently, educators must find a balance between leveraging AI capabilities and preserving humanistic interaction, ensuring that technology augments rather than replaces meaningful communication (Holmes et al., 2022).

4. Ethical Considerations: Bias, Privacy, and Access

The use of AI in language education generates significant ethical implications regarding bias, data privacy, and fair access (Bender et al., 2021; Aljabr & Al-Ahdal, 2024). Bias often arises from training data that reflect societal prejudices or uneven representation of languages and cultures, which can disadvantage learners from minoritized backgrounds (Bender et al., 2021). Data privacy constitutes another concern, as language learning applications collect detailed personal and behavioral data, raising questions about informed consent, ownership, and storage (Holmes et al., 2022).

Equitable access remains a major challenge, particularly in socio-economically diverse and multilingual contexts (UNESCO, 2021). The digital divide means that not all students have the necessary devices or connectivity to benefit from AI-enhanced tools. Institutions must therefore develop robust frameworks and provide resources to ensure that AI integration does not become a new mechanism of exclusion (Council of Europe, 2020; UNESCO, 2021). Teachers thus draw on AI-generated insights while remaining vigilant regarding algorithmic limitations and ensuring that professional judgment and contextual knowledge always mediate technological recommendations (Holmes et al., 2022; Aljabr & Al-Ahdal, 2024).

5. The Evolution of Digital Pedagogy: From Transmission to Facilitation

The infusion of AI fundamentally alters the role of educators, shifting responsibilities from transmission-oriented models toward mentorship in technology-rich environments (Tynny & Schukina, 2025). In conventional teaching, instructors functioned as primary knowledge sources; in contrast, digital pedagogy requires them to curate and orchestrate an ecosystem of AI tools aligned with specific learning outcomes (Holmes et al., 2022). Teacher–student interaction is increasingly characterized by co-learning, as educators foster student agency by enabling learners to explore AI tools such as chatbots and virtual or augmented reality environments in ways that promote autonomy and critical thinking (Reinhardt, 2020).

In multilingual contexts, such as translation and interpreting programs, educators’ responsibilities extend to ensuring equitable access and inclusive design that addresses diverse linguistic needs (Aljabr & Al-Ahdal, 2024; García & Flores, 2022). This requires continuous professional development to strengthen digital literacy, pedagogical adaptability, and intercultural competence (Ferguson, 2021; Crompton et al., 2024). Teachers must therefore remain alert to algorithmic bias and data privacy, ensuring that innovation remains ethically sound and pedagogically justified (Bender et al., 2021; Holmes et al., 2022).

6. Collaborative AI Platforms and Multilingual Scaffolding

AI-based platforms have transformed collaborative learning by supporting real-time interaction and the sharing of linguistic and cultural knowledge among students (Nykyropets et al., 2025). These environments provide opportunities to engage with peers’ varied linguistic repertoires and to co-construct meaning in the target language. Through adaptive technologies, platforms assess learners’ skills and deliver tailored tasks;

widely used applications such as Duolingo and Babbel leverage AI to adjust exercises to users' progress and challenges (Reinhardt, 2020).

AI platforms also facilitate inclusivity by providing scaffolding for learners with varied abilities and proficiency levels (UNESCO, 2021). Drawing on NLP, educators can design activities that accommodate heterogeneous profiles and support different proficiency levels (Jia et al., 2023). AI systems can offer real-time translations, glosses, and explanations, enabling students to engage with content without undermining the pedagogical focus on the target language (Lo Bianco, 2020). The incorporation of multilingual resources—switchable interfaces, bilingual materials, and parallel texts—allows students to mobilize their first languages as cognitive support, which can boost confidence and motivation (García & Flores, 2022).

7. Student Perceptions and the Shift in Proficiency

Recent studies indicate that students generally express favorable attitudes toward AI support in language learning, particularly valuing immediate feedback mechanisms (Kristiawan et al., 2024). Access to tailored resources and real-time corrections fosters a stronger sense of agency and engagement, contrasting with traditional approaches where feedback is often delayed (Zaim et al., 2024). AI-driven strategies can thus help lower affective barriers and create supportive environments for practicing language skills, especially in multilingual classrooms (Kristiawan et al., 2024).

However, the effectiveness of AI remains highly context-dependent, as students from different linguistic and cultural backgrounds respond differently to the same technologies (García & Flores, 2022). While AI-enhanced practices have been linked to gains in vocabulary retention and grammatical awareness (Schmidt & Strasser, 2022), educators must ensure that digital support does not replace human interaction. Institutional decisions must therefore be aligned with equity-oriented commitments, prioritizing tools that are pedagogically justified, accessible, and affordable for diverse student populations (UNESCO, 2021; ECML, 2024).

8. Case Study: Operationalizing AI in Interpreting Training at Badji Mokhtar-Annaba University

This section details the classroom protocol implemented in the 2024–2025 academic year with 45 Master 1 students enrolled in Simultaneous Interpreting and Consecutive Interpreting modules. The intervention aimed to guide students from AI-mediated preparation toward autonomous human performance while documenting both qualitative changes and basic quantitative indicators (Holmes et al., 2022).

8.1. AI-Mediated Interpreting Protocol: From Scaffolding to Agency

To transition students from literal decoding to strategic mediation, we implemented a four-phase weekly routine. This protocol utilizes the "Professional Agency" (a branch of computer science focused on building systems capable of performing tasks that typically require human intelligence. This includes Natural Language Processing (NLP) for translation and Machine Learning (ML) for adaptive learning paths.) model, using President Emmanuel Macron's 79th UN General Assembly speech as the primary corpus for application.

1.Phase 1: Lexical Scaffolding & Intent Mapping :30 mins | Pre-booth Preparation.

The Process: Students use AI to perform "predictive mapping," identifying macro-structures and key collocations to reduce lexical uncertainty (Reinhardt, 2020).

- **The Macron Application:** Students move beyond the "Bilingualism Misconception." For example, instead of simply noting "*trêve olympique*" as "Olympic truce," AI-assisted searches help students realize the term's weight regarding "Diplomatic Impotence."
- **Goal:** Moving from word-matching to understanding "intention and tone."

2.Phase 2: Assisted Performance & Shadowing Loop :45 mins | Real-time Feedback.

The Process: Students interpret live while ASR (Automated Speech Recognition) provides a real-time transcript. This acts as a "surrogate mentor" to help regulate Ear-Voice Span (EVS) and pacing (White, 2014).

- **The Macron Application:** During fast-paced enumerations, such as Macron's list of UN Security Council reforms, students monitor their EVS on-screen. If the lag exceeds 5 seconds, they must immediately apply "Shorten" strategies (compression) to maintain the speaker's rhythmic urgency.
- **Goal:** Developing real-time self-regulation and awareness of discourse flow.

3. Phase 3: Critical Analysis & the "Hallucination Hunt" :30 mins | Post-task Reflection.

- **The Process:** A comparative hunt where learners differentiate between "machine hallucinations" and human errors (Bender et al., 2021).

- **The Macron Application:** Students identify where AI fails to capture register shifts by comparing the French source with the official UN Arabic translation. For instance, the Arabic version's shift to a more direct, emotive register "هادي بعض ... الكلمات" demonstrates a strategic human choice for "soft power" that dry AI literalism often misses.
- **Goal:** Asserting human creative authority over "stochastic parrots."

4.Phase 4: Autonomous Delivery & Ethical Justification :15 mins | Final Synthesis.

The Process: A final synthesis where students re-interpret the speech without technological support to verify the internalization of strategies.

- **The Macron Application:** Following the performance, students must justify a "Creative Leap." They explain their choice to emphasize concepts like "*souveraineté*" or "*biens publics mondiaux*" based on audience appeal and cultural impact—the true markers of a professional.
- **Goal:** Confirming the transfer from "bilingual crutch" to professional autonomy.

8.2. Implementation and Qualitative Observations

In the Simultaneous Interpreting module, the use of QuillBot for segmentation and condensation helped students break complex sentences into manageable units, which they then rehearsed before entering the booth (Kukulska-Hulme, 2020). This preparatory step appeared to lower cognitive load during live delivery and encouraged greater lexical variation in output (Reinhardt, 2020).

At the same time, the integration of real-time ASR raised issues of cognitive overload (White, 2014). Some learners fixated on the on-screen transcript, which disrupted their prosody and eye contact and occasionally led to mechanical intonation. These observations suggest that ASR can be a useful safety net but risks becoming a source of distraction when not carefully regulated by the instructor (Holmes et al., 2022).

In the Consecutive Interpreting module, AI tools were mobilized primarily to support note-taking and post-task reflection (Godwin-Jones, 2023). Using speeches from the European Commission's Speech Repository, students compared their handwritten notes and reconstructions with AI-generated transcripts, which enabled them to identify syntactic interference, missing connectives, and recurrent omissions more rapidly than in traditional formats (García & Flores, 2022). This reflective loop strengthened their

metacognitive awareness of both strengths and weaknesses in their note-taking systems (Rheingold, 2012).

8.3. Discussion: The "Macron Case Study" and the Shift to Strategic Mediation

To address these challenges; specifically the risk of "transcript fixation"; we introduced the four-phase protocol using President Emmanuel Macron's 79th UN General Assembly speech. This specific case study demonstrates the final evolution from linguistic dependency to active professional agency:

1. Overcoming the "Stochastic Parrot": The findings suggest that the AI's "literalism" in translating Macron's nuanced diplomatic rhetoric served as a productive pedagogical "foil." Large language models function as "stochastic parrots" (systems that mimic language patterns without genuine understanding (Bender et al., 2021)) and this limitation became pedagogically valuable. When faced with high-register metaphors (e.g., "l'emprise nazie") or the shift into a regional Arabic register (... هادي بعض الكلمات), students were forced to exercise critical thinking to override the AI. This "override" is the exact moment professional agency is born; the student ceases to be a decoder and becomes a cultural mediator.

2. Scaffolding for Self-Regulation: By framing DeepL Voice not as a transcript to be read, but as a "surrogate mentor," students began using it to monitor their Ear-Voice Span (EVS). Instead of becoming overwhelmed by Macron's pace, students utilized the visual feedback to apply "Shorten" strategies (compression). This shift proves that technology, when framed correctly, does not create dependency; rather, it provides the scaffolding necessary for students to internalize the strategic responsibilities of a professional.

9. Quantitative Indicators

To complement qualitative observations, four simple indicators were monitored over a 12-week semester and compared with internal benchmarks from previous cohorts taught without systematic AI integration (Crompton et al., 2024; Kristiawan et al., 2024).

Table 2. Comparative Performance Metrics (Pre- vs Post-AI Integration)

- Terminology accuracy: 68% → 81% (+19%).
- Mean ear-voice span (EVS): 4.2 seconds → 2.8 seconds (-33%).
- Self-correction rate: 1.5 → 3.2 corrections per minute (+113%).
- Asynchronous practice: 2 → 5.5 hours per week (+175%) (internal cohort data).

9.1. Engagement and Autonomy

The most salient change concerns asynchronous practice, which almost tripled once students could access tools such as DeepL Voice and QuillBot on their smartphones outside scheduled class time (Kristiawan et al., 2024). The learning space thus extended beyond the interpreting lab, and classroom time could be reallocated from basic monitoring to higher-order feedback and strategy coaching (Crompton et al., 2024).

9.2. Accuracy and Latency

The increase in terminology accuracy appears closely linked to Phase 1, where AI-supported predictive mapping allowed students to pre-activate technical vocabulary and phraseology (Golub et al., 2023). This preparation freed cognitive resources for managing prosody and discourse markers during live interpreting (Reinhardt, 2020). The reduction in EVS suggests that exposure to real-time transcripts made students more aware of their lag and enabled them to experiment with tighter pacing, although the risk of over-reliance on visual prompts remained (White, 2014).

10. Discussion: Human–Machine Mediation in a Triglossic Context

The Annaba protocol illustrates how AI can function as a linguistic bridge in a triglossic environment where Arabic (L1), French (L2), and English (L3) coexist in complex ways (Benrabah, 2013). AI-based glossaries and transcripts helped students negotiate cross-linguistic transfer, but also revealed a plateau effect: after approximately eight weeks, progress slowed when tasks remained heavily AI-mediated and were not complemented by “degraded modes” (tasks performed without technological support) with no technological support (Holmes et al., 2022).

10.1. Algorithmic Bias and Local Nuance

Across the semester, AI outputs showed recurrent Western-centric biases, especially in the treatment of North-African French and culturally specific references (Aljabr & Al-Ahdal, 2024; Bender et al., 2021). In roughly 12% of sessions, systems produced misleading false friends or inappropriate register, which students were encouraged to flag and explain during Phase 3. This hallucination hunt repositioned learners as active cultural mediators who critique AI suggestions rather than accept them at face value (García & Flores, 2022).

10.2. From Dependency to Critical Agency

The most successful students were not those who followed AI output most closely, but those who knew when to override it based on contextual and pragmatic considerations (Kristiawan et al., 2024). Their stance shifted from that of users of digital tools to critical

post-editors capable of justifying their interpretive choices (Holmes et al., 2022). In this process, the teacher's role evolved into that of an ethical mediator who guards against cognitive laziness, foregrounds professional standards, and scaffolds critical digital literacy (Crompton et al., 2024; Rheingold, 2012).

11. Institutional Implications

For such practices to be sustainable and equitable, institutional measures are required (UNESCO, 2021). The study points to three priority areas:

1. **Hybrid assessment:** Evaluation should combine product-oriented criteria (accuracy, fluency, terminology) with process-oriented indicators, including explicit justification of post-editing and tool use (Council of Europe, 2020).
2. **Digital literacy and ethics:** Training on data privacy, terms of use, and algorithmic bias is needed, given that tools like QuillBot and cloud-based ASR systems process sensitive linguistic data (Aljabr & Al-Ahdal, 2024; Holmes et al., 2022).
3. **Technological equity:** Persistent connectivity issues and unequal access to devices remain significant barriers at Annaba. Institutions should therefore invest in on-campus infrastructure and, where possible, provide offline resources to ensure that AI does not become a new mechanism of exclusion (UNESCO, 2021).

12. Conclusion

This study argues that AI-enhanced digital pedagogy can effectively support engagement, personalization, and multilingual scaffolding in interpreter training, provided that human mediation remains central (Holmes et al., 2022; Godwin-Jones, 2023). The Badji Mokhtar-Annaba experience shows both measurable gains in terminology management and latency, and renewed demands on teachers as facilitators, data interpreters, and ethical guardians (Crompton et al., 2024). As multilingual higher education systems such as those in Algeria continue to experiment with AI-enhanced language and translation curricula, sustained research, institutional support, and critical reflection will be indispensable (ECML, 2024; Zawacki-Richter et al., 2019). Under these conditions, AI and digital pedagogy can contribute to language education that is not merely technologically innovative, but also inclusive, ethically informed, and aligned with the complex realities of global communication (UNESCO, 2021; García & Flores, 2022).

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