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The Future of AI in Teaching Spanish as a Foreign Language

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ABSTRACT

Artificial Intelligence (AI) technologies have advanced unprecedentedly and disrupted the conventional sectors and their approach. Among these domains, language education remains a field that can benefit immensely from transformation. In particular, the foreign language teaching field has received significant focus in the last few decades due mainly to the need for new methods of language learning that best fit an ever more global world. This paper investigates the role of AI in improving Spanish teaching and learning, focusing on theoretical aspects as much as practical use in real life that address current pedagogical needs. In this paper, we will explore case studies exemplifying successful AI integrations while teaching Spanish, providing examples of how technology can elevate learner engagement and success. Furthermore, this study examines the potential benefits, challenges and ethical considerations of incorporating Artificial Intelligence (AI) in Spanish as a Foreign Language (SFL). Through this research, we will provide insights on how AI can be efficiently utilised in SFL education to improve the learning experience for students and teachers.

Keywords: Natural language processing, Intelligent tutoring systems, Automatic speech recognition, Spanish as a foreign language

INTRODUCTION

Artificial Intelligence is a term that was first introduced in 1956 and has since been continuously improved and only radically evolved. There was research on Artificial Intelligence (AI) between the years 1956 and 1974 where leading figures like John McCarthy, Marvin Minsky, Allen Newell, and Herbert A. Simon contributed extremely at the initial stage of AI. The role of AI in education around the globe has surged greatly and its significance has been growing exponentially. The explosion of AI is driven by the most promising potential to revolutionise educational practices and frameworks by providing students with effective and more personalised learning opportunities (Sanabria-Navarro *et al.,* 2023)

We all know that AI is rapidly changing several education areas, including language learning. The education industry has seen an enormous rise in artificial intelligence utilisation, capable of providing adroit and effective methods of enhancing student learning. (Murali Krishna Pasupuleti) Natural Language Processing (NLP), data-driven learning (DDL), automated writing evaluation (AWE), computerised dynamic assessment (CDA), intelligent tutoring systems (ITSs), automatic speech recognition (ASR), and chatbots are some AI technologies that are entering the field of language teaching. This access to information through technology has created many opportunities to support language learning and teaching. Example: NLP helps in analysis and understanding language with certain patterns, and AWE is known to offer an automatic response to the writing of certain assignments ASR can enable intelligent tutoring systems to provide individualised teaching and assistance and ways for pupils to improve their speech. (Son *et al.*, 2023).

While educators work to develop multilingual competencies for learners, it's vital to consider how AI

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can enhance these efforts or create new challenges. Data-driven approaches to language processing have contributed to developing AI-powered tools, which can adapt to individual learners' needs and enable personalised language learning experiences tailored to different learner profiles (Tajik). Simultaneously, technology is changing quickly, showcasing a range of AI solutions in language classes that deliver novel language learning methods. These developments call for a closer look at the pedagogical practices that will best harness AI tools according to sound educational principles (Ghorbandordinejad and Kenshinbay , 2024).

Furthermore, there are cultural contexts and ethical ramifications of the uses of AI in language education that must be reconciled. These considerations ensure that technology drives education, intercultural understanding, and awareness. Evaluating the impact of AI in language learning devices allows us to measure efficacy and calibrate our methodologies accordingly.

Literature Review:

AI is quickly revolutionising different areas of education, including language learning. The literature review on AI technologies and applications for teaching Spanish as a Foreign Language explores key trends, common findings, and possible implications of AI in SFL education. This review also discusses some new technologies, such as Natural Language Processing (NLP), Data-Driven Learning (DDL), Automated Writing Evaluation (AWE), Intelligent Tutoring Systems (ITSs) and chatbots. It recognises the challenges and gaps in the research direction within this changing landscape.

Although research on AI-supported language learning has been limited and slow to develop, the advancement of AI has accelerated (Son *et al.*, 2023). This may be evidenced by existing literature demonstrating the potential for technology as a mediating tool but concluding that some effectiveness is still needed for communication and collaborative design. We argue that teachers play an essential role in intervention configuration and pedagogical design, with further research exploring the impact of AI on the classroom and real-life contexts in mind (Yang and Kyun, 2022).

This study uses a qualitative approach to discuss using Artificial Intelligence (AI) for teaching Spanish as a foreign language. Thematic analysis will identify patterns and themes regarding AI's benefits, challenges, and effectiveness in teaching Spanish. It will also be on perspectives for optimising these AI tools in this context.

Theoretical Framework of AI in Language Acquisition:

Exploration of Second Language Acquisition Theories:

Invoking theories of second language acquisition (SLA) and artificial intelligence (AI) tools in teaching Spanish as a foreign language can serve as an analysis framework. As an illustration, the Interaction Hypothesis highlights communicative activity as vital; AI-driven conversation tools such as Replika or Duolingo chatbots allow learners to participate in simulated conversations that mirror real-world exchanges, building communicative fluency in reading and engaging in Spanish. In the same way, the Output Hypothesis underlines that we learn to speak by speaking; AI-powered platforms like LanguageTool or ChatGPT provide instant reviews of your grammar, vocabulary, and structure, which promotes active Spanish output and helps you learn (Huang *et al.*, 2024)

Constructivist approaches are increasingly complemented by AI (artificial intelligence) technologies, which mediate knowledge construction for foreign language teaching purposes. AI-based platforms such as Duolingo and Memrise have the capacity to automatically tailor learning experiences to the individual user's proficiency level; they enable the students to interact with Spanish vocabulary and grammar: actively and meaningfully. Similarly, platforms like Tandem or HelloTalk use AI to pair language learners with native speakers, promoting cooperative interaction and providing cultural exchange. This not only allows for a greater understanding of how the constructed language functions together but also allows the student to become a little more aware of the culture surrounding the Spanish speakers. This promotes language acquisition and enhances active learning in line with constructivist paradigms (Ghorbandordinejad and Kenshinbay, 2024).

Technological Landscape of AI Applications in Education:

Overview of AI Technologies Utilized in Language Instruction:

Disciplinary advancements in SFL teaching practices, commencing from AI technologies, have enabled teaching methodologies that facilitate gained yet lucid teaching and learning experiences. Natural

Language Processing (NLP) tools are great at this — like ChatGPT or the conversation mode in Google Translate — they give us instant feedback and allow us to have a back-and-forth negotiation of statements, some of which may help us improve our conversational Spanish. Much like with platforms like Lingvist or Rosetta Stone, machine learning algorithms are used to analyse each student's performance data, customising lessons and recommending targeted resources to establish individualised pathways for language acquisition. Such progress enhances language proficiencies and empowers teachers to employ more responsive and efficient teaching methods. As technology in AI expands, it lays the foundation for transforming foreign language instruction, making learning Spanish even easier, more interesting, and more effective (Pasupuleti, 2024).

Machine Learning Algorithms and Their Application in Language Learning Tools:

Machine learning is changing how people learn foreign languages, particularly Spanish. These are the same algorithms apps like Duolingo and Babbel use to assess how fast or slow users are going and create personalised lessons that change the topics and difficulty of such lessons based on their needs. For example, if students struggle with verb conjugations, the system can give focused exercises to help them practice. AI-driven applications like Lingvist and Busuu provide real-time feedback and personalised practice, streamlining language learning. These innovations help improve student learning and allow educators to take a more flexible, data-driven approach to teaching (Prasad and Verma, 2022).

Natural Language Processing: Enhancing Learner Interactions with Spanish:

Natural Language Processing (NLP) technologies are changing the landscape of foreign language education around the globe. Tools such as ChatGPT and Replika serve as virtual tutors, allowing learners to practice speaking in real-time, something not easily facilitated in a typical classroom and encouraging genuine interaction with the language. Moreover, NLP-driven platforms like those used in Grammarly for Spanish and Speechling, are able to closely analyse how learners speak and write, offering detailed feedback that accounts for individual pitfalls and gaps in a learner's speech patterns, syntax, and grammar—thereby targeting pronunciation errors or erroneous grammar use before they become ingrained habits. For example, a learner with subjunctive mood can be offered targeted exercises and explanations. This dual-action strategy—maximising user engagement while offering individualised correction—makes a considerable leap in the efficiency of second language absorption and retention in the context of AI-aided learning (Pasupuleti, 2024)

Pedagogical Strategies Leveraging AI for Teaching Spanish:

Gamification and Engagement through AI-driven Platforms:

In foreign language education, especially teaching Spanish, gamification strategies that use artificial intelligence are revolutionising learner engagement. Services such as Duolingo and Memrise automate this with adaptive quizzes and interactive stories, constructing a challenge tailored to anyone's current level of proficiency within an ambient learning experience. A beginner could be administered basic vocabulary games, while an advanced learner would work on complex sentence-building exercises. Competitive features like leaderboards and rewards—common in apps like Quizlet and Lingvist—add motivation to practice regularly and create a sense of learning community. Overall, this combination of gamification and AI could lead to motivations that invite more research into its ability to facilitate pedagogical effectiveness and sustain enthusiasm for long-term learning in Spanish language systems (Alenezi, 2023).

AI-assisted Pronunciation and Phonetic Training Techniques:

AI-powered pronunciation and phonetic training is taking Spanish learning to the next level. Platforms such as Speechling and Rosetta Stone employ sophisticated speech recognition to provide immediate feedback on pronunciation, assisting learners with challenging sounds such as the rolled "r," as well as the nuanced differences between "b" and "v." AI-driven apps such as Elsa Speak and Forvo also personalise lessons depending on each learner's skill level, tracking progress in their journey toward mastering specific Spanish sounds. These tools take practice a step further, though–by coupling real-time feedback with adaptive learning and making practice not only more fun but also enhancing retention and fluency. There's no question that AI is revolutionising language education; what's still being debated is its effectiveness

and place in various learning settings (Ansari, 2024).

Feedback Mechanisms: Real-time Assessment through AI Tools:

In the world of foreign language education, especially in Spanish teaching, AI tools have fundamentally changed feedback systems by immediately evaluating pronunciation, grammar, and vocabulary usage. For instance, language platforms such as Duolingo and Babbel analyse sound input and provide feedback on spoken pronunciation. In contrast, language-checking tools like the Spanish version of Grammarly, Language Tool and ProWriting Aid offer real-time grammar and style checking. They work on phonetic accuracy, specifically with apps like Elsa Speak and Speechling, while also tailoring the learning experience with adaptive learning algorithms as seen in apps such as Lingvist, Busuu, and Rosetta Stone, all of which provide customised feedback based on user progress. These developments underscore the promise of this AI for language education and warrant further exploration of the implications of AI for instructional design and learning impact (Tajik. 2025).

Cultural Contexts and Ethical Considerations in AI Deployment:

This article scrutinises the cultures and ethics behind the implementation of artificial intelligence (AI) in education, specifically exploring the use of AI in learning Spanish as a foreign language. An example of this phenomenon would be that an AI tool like Duolingo and Rosetta Stone must ensure that they have culturally relevant content (for example, all the variants of Spanish have to be included, considering European and Latin Spanish differences). Platforms like Babbel and Lingvist also raise ethical issues with data privacy, as they collect user input to adjust the learning experience. Moreover, algorithmic bias in language learning tools such as Grammarly for Spanish or Speechling may not just merely prioritise linguistic norms but also marginalise learners based on their linguistic contexts. Ultimately, the issue of the sustainability of AI-based practices (of which Busuu, Memrise employs) must be examined and addressed to secure long-term availability and equity. This will contribute to a more inclusive, ethical, and sustainable approach to integrating AI into Spanish language education (Zaman, 2023).

Cultural Relevance: Adapting AI Content for Diverse Learners:

This research presents an opportunity for AI-driven platforms to integrate culturally relevant content that both engages learners from all backgrounds and increases understanding. For instance, Spanish learning tools can use regional dialects, cultural traditions and real-life scenarios from countries like Mexico, Spain and Argentina to make learning more relatable. Likewise, platforms like Babbel and Lingvist may add multimedia content, including videos and podcasts, that capture the cultural diversity of the Spanish-speaking world. Like ChatGPT's multilingual capabilities and Speechling's culturally adaptive feedback, AI-based solutions must be developed through partnerships with cultural sponsors and community stakeholders to ensure equitable access and representation (Balasubramanian, 2021).

Ethics of Data Privacy in AI-driven Educational Tools:

Bringing artificial intelligence (AI) into education has opened up new possibilities for tailoring learning to individual needs and creating fresh, innovative ways of teaching Language learning apps such as Duolingo, Babbel, and Rosetta Stone gather personal information for a personalised approach to education, so proactive data protection is essential to adherence to regulations such as the Digital Personal Data Protection Act (DPDP) of 2023. For example, platforms like Lingvist and Busuu must guarantee user data encryption and safe storage to protect sensitive data. For instance, how Grammarly for Spanish and other Speechling products discloses how their data is processed is also crucial in establishing trust among educators and students. It sets forth clear privacy policies and provides mechanisms for informed consent, giving users the power to decide how their data is used. The overarching ethical lens balances the hot pursuit of technological innovation against the care of moral integrity in the current context of foreign language education. (Zaman, 2023).

Impact Assessment: Measuring Effectiveness of AI in Language Learning:

Quantitative Metrics for Evaluating Learner Outcomes with AI Tools:

As a case-study approach to understanding the role of artificial intelligence (AI) in teaching Spanish as a foreign language, quantitative metrics are essential to measuring what a learner can do. Duolingo, Babbel, and

others leverage test scores, completion rates, engagement analytics, and similar metrics to help tell the story about how particularly effective their AI interventions are in improving language proficiency and fluency. For instance, platforms like Lingvist and Busuu, measure vocabulary retention rates and speaking fluency metrics and report data-driven insights into learner progress. Longitudinal studies using metrics from the competitors, Rosetta Stone or Memrise, offer insights into trends and patterns in learner performance over time and demonstrate how those technologies can drive continued improvement in language acquisition (Moreira and Teles, 2024).

Qualitative Research Methods: Understanding Learner Experiences:

Interviews and focus group qualitative research methods are necessary to understand what learners think of artificial intelligence (AI) applications for Spanish language acquisition. Native apps like Duolingo and Babbel could be evaluated using learner feedback to uncover how features like gamification or chatbots enhance motivation or increase engagement. Likewise, play with ChatGPT or Speechling to see how they feel emotionally and personally, as in what kind of confidence a learner gains when getting speech pronunciation feedback in real-time. By looking at qualitative data, teachers can find specific pain points (adapting to AI-powered grammar correction) and positive outcomes (increased fluency through personalised practice). By utilising advanced analytics and algorithms to analyse vast amounts of data, AI can provide insights into individual learning patterns, preferences, and progress, which can then be used to design personalised instruction that accommodates the needs of all learners while illuminating the complex dynamics between artificial intelligence and learner experiences in the realm of Spanish language acquisition (Moreira and Teles, 2024).

Comparative Analysis: Traditional vs. AI-enhanced Language Instruction:

The emergence of artificial intelligence (AI) in language teaching represents a paradigm shift away from conventional pedagogical methods. Unlike traditional approaches that follow a one-size-fits-all model, AI-enhanced tools such as Duolingo, Babbel, and Lingvist provide personalised learning experiences that are tailored to the needs of each individual, such as the flexibility to adjust difficulty levels depending on a learner's performance. For instance, applications such as Rosetta Stone and Memrise utilise AI to instantly correct pronunciation and grammar, which is not an option in a regular classroom. This is possible because AI-based tools like ChatGPT and Speechling are creating interactive and immersive environments that provide real engagement in the form of conversational practice and real-world simulations, quite different from the passive nature of traditional instruction. One is oriented towards a more conventional learning model, while the other emphasises a more dynamic and adaptive learning experience (Gladwin, I.V. and Stepp-Greany, 2009).

Potential Innovations in Conversational Agents and Chatbots for Spanish Learners:

As the frontier of foreign language education continues to shift, conversational agents and chatbots emerge as crucial instruments for advancing the learning experience for Spanish students. This has led to innovations such as ChatGPT, Replika and Duolingo's chatbots which provide personalised feedback and create adaptive learning pathways, allowing learners to take part in conversation scenarios tailored to their level of proficiency. Tools like HelloTalk and Tandem use natural language processing (NLP) to create real-life Spanish immersion-seeking environments and let students try real-world conversations with native speakers or AI-based language partners. Not only do these interactions help with fluency in conversation, but they also teach cultural competence by exposing learners to regional dialects and cultural nuances and offering the opportunity to converse with natives. As we explore these innovations, we discover their innovative power to build a much more effective, integrative and dynamic model of teaching Spanish as a foreign language (Perez-Marin and Pascual-Nieto, 2021).

Cross-disciplinary Collaborations to Enhance Educational Technology Research:

Integrating a cross-disciplinary approach in Spanish as a foreign language (SFL) learning is a unique method of enhancing language education research and incorporating it into the growing field of educational technology. The Interactive digital environment (IDE) encompasses a myriad of facets interacting and intersecting, bringing together linguists, AI researchers, and educators to create language learning algorithms that can be highly nuanced and address the specific difficulties

of Spanish such as verb conjugations or differentiation by region and dialect. These techniques have come about through collaborative efforts between AI specialists and linguists who work together to produce solutions tailored to address specific challenges, such as the adaptive learning model of Duolingo or Babbel's speech recognition software. Leveraging insights from cognitive science or educational psychology within platforms like Lingvist and Rosetta Stone will lead to more personalised learning experiences that will help with engagement and retention. These collaborative endeavours not only contribute to more efficient teaching processes but also emphasise the possibility of aligning technology with language education to craft transformative learning experiences (Sanabria-Navarro *et al.*, 2023)

Policy Implications for Integrating AI into Foreign Language Curricula:

With the increasing integration of artificial intelligence (AI) within foreign language education, specifically for most foreign language students in India, focus on the policy impacts of this technology must become top-of-mind. It will be essential to require companies to follow guidelines for the ethical use of AI to ensure equitable access to resources like Duolingo, Babbel and Rosetta Stone. Policies, for example, must ensure AI platforms — such as Lingvist, Speechling or the ones mentioned in this article's first paragraph — do not nurture biases or marginalise underrepresented learners. Moreover, leveraging AI tools within teacher training programs will equip educators to properly utilise tools such as ChatGPT or Grammarly for Spanish, contributing to more interactive and personalised learning face-to-face experiences. Not only does this data reinforce the necessity for concerted action in the realm of policy regulation, but it also showcases the growing role that AI will play in training future curriculums and propelling Spanish language enthusiasts into a new generation of learning.

Case Studies Illustrating Successful Integration of AI in Spanish Teaching:

Institutional Case Study: Implementation of an AI-based Curriculum Model

This paper shall serve as a thorough case study discussing the use of one such AI-based curriculum model employed in the foreign language department of Lovely Professional University during the years 2022 and 2023 by the author, particularly in the successful implementation of the model in teaching Spanish. Central to this project was an internal assessment using the AI-oriented language learning platform Duolingo. For instance, Duolingo's adaptive learning system, which draws on student performance data to tailor exercises to a level that is challenging but not too difficult for the student to complete, was shown to significantly increase student engagement levels. For example, students who previously expressed little interest in learning Spanish were motivated to do so through gamified lessons found on Duolingo, which reward users with points for completing tasks or competing against others with the highest leaderboard scores. The immediate feedback provided by the platform on aspects like grammar, vocabulary, and pronunciation — such as correcting verb conjugation mistakes, e.g., "ser" versus "estar," or directing learners on how to roll their "r" — provides students with the opportunity to develop confidence and gradually enhance their skills.

In addition, students started to exceed assignment expectations, often adding lessons and speaking exercises outside of the mandated coursework to practice on their own time. Such behaviour change was especially significant for students who previously demonstrated a starting interest in language learning (e.g., pronounce beginning words as the girl described in the video, use starting words, etc.) In another case, a student who was at a loss for basic vocabulary began using Duolingo daily, working up to advanced topics, such as the subjunctive mood and idiomatic expressions. And when their motivation waned, often the motivating features of the platform — personalised learning pathways, streaks, and badges — helped keep them engaged.

The observation from Duolingo's AI-powered evaluations showed a significant improvement in language retention rates since students regularly practised and reviewed content already acquired. This is in line with Duolingo's use of spaced repetition algorithms, which space out learning to reintroduce vocabulary and grammar points at the points of optimal use. For example: students who had previously struggled to master different types of irregular verbs—such as "tener" or "hacer"— could improve significantly after multiple months of usage of the platform and consecutive review cycles. Such results exemplify the game-changing power of A.I. tools such as Duolingo in teaching or learning foreign languages. The best language learning through AI helps us redefine a conventional pedagogical approach. This observation

has also shown how AI can be useful at a larger scale through Spanish programs, enabling more interactive learning experiences.

Conclusion:

Above all, in the present research paper, we have reviewed the multi-dimensional role of artificial intelligence in the field of Spanish as a foreign language teaching by opening the "black box" of teaching artificial intelligence by accepting all its possibilities and challenges. Through a detailed review of the theoretical basis for AI as it pertains to language learning, we show that AI can both charge cognitive engagement and enable individual learning experiences. The technology scene is as varied as it gets, ranging from intelligent tutoring systems to adaptive learning platforms, so teachers must keep themselves updated on new tools that can assist language teaching.

AI-powered pedagogical methods exemplify progressive approaches that support linguistic development while enhancing cultural competency, a central tenet of language instruction. Instead, the ethical implications need to be considered to enable fair access and reduce biases present in AI systems. In a more forward-looking sense, this study highlights the need for an interdisciplinary collaboration of linguists, technologists, and educators to be able to find directions for how AI could (and should) develop in educational settings. Examples of successful implementations of AI in Spanish teaching are provided as case studies, shedding light on best practices and orientations for practitioners. While AI can transform foreign language education, stakeholders must be on guard for its implementation. I believe the more we address ethical concerns and promote inclusive practices in using AI, the better we can ensure that the integration of this technology not only enhances the learning experience but also respects the cultural dimensions inherent to language learning. Such dynamics merit further research, particularly in the context of an ever-more digital educational environment.

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