Journal of Information Systems Engineering and Management
20--, Vol(Iss)
e-ISSN: 2468-4376
https://jisem-journal.com/

Research Article

AI and Second Language Acquisition in Multilingual Scenarios

Dr. Sudhir Kumar Patnaik[1*], Dr. Amol Rameshrao Bute[2], Dr. P. Prasantham[3], Ms .Anshu Priya[4], Dr. Eswara Rao Majji[5]

[1]*Senior Assistant Professor, Department of Basic Science and Humanities, GMR Institute of Technology, Rajam, Andhra Pradesh, India, sudhirkumar.p@gmrit.edu.in*

[2]*Senior Assistant Professor, Department of Basic Science and Humanities, GMR Institute of Technology, Andhra Pradesh, Rajam, India, rameshrao.a@gmrit.edu.in*

[3]*Associate Professor of English, Aditya Institute of Technology and Management, Srikakulam, Andhra Pradesh, India, peerlaprasantham@adityatekkali.edu.in*

[4]*Assistant Professor, Katihar Engineering College, Katihar, Bihar, India, Anshu.singh91@gmail.com*

[5]*Dr. Eswara Rao Majji, Assistant Professor, Department of Basic Science and Humanities, GMR Institute of Technology, Rajam, Andhra Pradesh, India, eswararao.m@gmrit.edu.in*

**Corresponding author: sudhirkumar.p@gmrit.edu.in*

ARTICLE INFO

Received: 31 Dec 2024

Revised: 20 Feb 2025

Accepted: 28 Feb 2025

ABSTRACT

Introduction: This article focusses on the application of artificial intelligence in language learning, particularly in multilingual communities. It discusses how interest is generated to learn languages and increase the accessibility with the help of machine learning (ML) and Natural Language Processing (NLP). With the help of various examples, the article shows how there is a huge scope for AI in language learning and also touches upon future implications and implementation.

Objectives:

To explore the role of Artificial Intelligence (AI) in enhancing second language acquisition, particularly in multilingual contexts.

To examine the contributions of key AI technologies such as Natural Language Processing (NLP), Machine Learning (ML), and speech recognition in language learning.

Methods: This study adopts a qualitative, exploratory approach to understand the intersection of Artificial Intelligence (AI) and second language acquisition within multilingual settings. The methodology involved:

1. **Literature Review**:

A comprehensive review of existing academic literature, research papers, and industry reports related to AI applications in language learning was conducted. Key sources include peer-reviewed journals, conference proceedings, and credible organizational publications (e.g., UNESCO, Duolingo, Microsoft).

2. **Case Study Analysis**:

Specific AI tools and platforms—such as Duolingo, Google BERT, and Microsoft Translator—were examined as case studies to evaluate their practical use in supporting second language learners across multilingual scenarios.

3. **Thematic Content Analysis**:

The collected data were analyzed thematically to identify recurring trends, technological innovations, user engagement patterns, and challenges in AI-driven multilingual education.

4. **Comparative Evaluation**:

Features of AI-powered tools were compared across different platforms to assess their adaptability, feedback mechanisms, and cultural inclusivity.

Results: AI enhances multilingual language acquisition through personalized learning, real-time feedback, and translation tools, while challenges like linguistic bias, data scarcity, and cultural insensitivity still persist in low-resource language contexts.

Conclusions: AI revolutionizes second language acquisition in multilingual settings by offering adaptive, efficient learning tools. Addressing biases and supporting low-resource languages will ensure inclusive, equitable, and culturally sensitive language education.

Keywords: Machine Learning (ML), Language Acquisition, AI, Natural Language Processing (NLP), Language Learning

INTRODUCTION

The world is connected with a huge network of languages. Multilingualism has emerged as a major trend. As per the UNESCO (2023) approximately 7000 languages are spoken across the globe.

The AI has disrupted the processes of language learning in the class room set up.. AI-based language learning apps such as Duolingo and Babbel provide customized, adaptive, and gamified learning (Chen & Li, 2023). The NLP algorithms scan learner mistakes and give real-time feedback, thus accelerating and enhancing the learning process.

This paper will examine the effect of AI in multilingual language learning, determine important issues, and provide directions for research in the future.

2. How AI Supports Language Learning

The effectiveness of AI in language learning greatly relies on NLP and ML algorithms. The systems are programmed to comprehend, analyze, and produce human language (Singh & Sharma, 2022).

Natural Language Processing (NLP)

NLP programs process text and speech information to comprehend linguistic context. This allows AI-driven chatbots and virtual tutors to converse like humans.2.2 Machine Learning (ML)

ML algorithms track learners' progress and recommend personalized learning paths. Advanced models like Google BERT excel at understanding complex linguistic nuances (Devlin et al., 2019).

Speech Recognition and Synthesis

AI-driven speech recognition systems identify pronunciation errors and provide corrective feedback. Over time, these models improve their accuracy through continuous learning (Zhao & Chen, 2021).

Multilingual Translation Systems

AI models like Google Translate and Microsoft Translator offer real-time language translation using cross-lingual transfer learning. This also benefits low-resource languages by enhancing their representation.

Table 1: Key AI Applications in Language Acquisition

Application Area	Example Tools	Key Features
NLP and Chatbots	ChatGPT, Duolingo AI	Conversational practice, real-time feedback
Speech Recognition and Synthesis	Google Speech-to-Text, Siri	Pronunciation analysis, corrective feedback
Machine Translation	Google Translate, Microsoft Translator	Real-time multilingual translation
Adaptive Learning Platforms	Babbel, LingQ	Personalized lessons, progress tracking

Challenges in Multilingual Contexts

Multilingual learners face various cognitive and technological challenges. AI provides tailored solutions to address these issues.

Cognitive Challenges

- Code-switching and Language Interference: Learners may mix languages or struggle with interference.
- Pronunciation and Grammar Errors: AI algorithms detect and correct these issues.
- Memory Overload: Managing multiple languages can be mentally taxing.

Technological Challenges

- Data Scarcity: Low-resource languages often lack sufficient training data.
- Linguistic Bias: AI algorithms may exhibit biases towards dominant languages.
- Contextual Understanding: Non-dominant languages may face limited contextual comprehension.

Socio-Cultural Challenges

AI models may fail to accurately represent regional dialects and cultural nuances. This can lead to misinterpretations (Buolamwini & Gebru, 2018).

Table 2: Challenges and AI Solutions

Challenge	Description	AI Solution Example
Code-Switching	Mixing languages in a single sentence	Multilingual AI models like BERT
Pronunciation Errors	Incorrect pronunciation	Speech recognition tools
Data Scarcity	Lack of data for low-resource languages	Cross-lingual transfer learning
Linguistic Bias	Bias towards dominant languages	Diverse dataset integration

4. AI Solutions for Multilingual Learning

Personalized Learning Platforms

Smart apps such as Duolingo and Babbel monitor user activity and suggest customized lessons. They examine learner errors in order to provide guided practice exercises.

Virtual Tutors and Chatbots

Artificial intelligence chatbots such as ChatGPT involve learners in conversation practice, providing immediate feedback to build fluency and confidence.

Real-Time Translation Tools

Microsoft Translator and Google Translate facilitate multilingual communication during meetings and conferences by providing accurate real-time translations.

5. Case Studies

Duolingo

Duolingo makes learning fun with its adaptive learning algorithms analysing the behaviour of users and deliver personalised modules. It effectively uses AI in preserving indigenous languages like Navajo and Hawaiian (Duolingo, 2023).

Google BERT Model

BERT employs pre-training and fine-tuning techniques to enhance multilingual translation accuracy, providing a significant boost in understanding sentence context (Devlin et al., 2019).

Microsoft Translator

Microsoft Translator offers AI-powered real-time translation, widely used for cross-border business communication and academic conferences (Microsoft, 2022).

Ethical and Social Considerations

AI is gaining momentum day by day in the area of multilingual learning. Many AI powered platforms can easily offer customised lessons based by monitoring the progress of learners. The feedback systems allow users to analyse their gaps in understanding and can further improve language learning. It also facilitates cross-cultural communication by bridging the gaps of geographical boundaries.

The future of AI and its power is tremendous and it should be aimed to mitigate AI biases and support languages with low resources.

Future Prospects

AI in language acquisition is expected to become even more advanced:

Integration of text, visuals and speech will improve the learning experience with the help of AI models. This multimodal learning will have a deep impact on the multilingual scenarios.

Emotion Recognition will be easier as AI systems will be able to grasp the learner's emotional state of mind and give may help in designing a more customised lessons..

Few-shot learning models or Zero-shot learning models can enhance and improve underrepresented languages.

Conclusion

AI is simplifying and accelerating multilingual language acquisition. AI-based platforms track learner progress and provide personalized feedback, breaking language barriers and promoting cross-cultural communication.

Future research should focus on reducing AI biases, improving support for low-resource languages ensuring inclusive algorithm design.

REFRENCES

[1] Buolamwini, J., & Gebru, T. (2018). Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification. Proceedings of the Conference on Fairness, Accountability, and Transparency.
[2] Chen, X., & Li, Y. (2023). AI in Language Learning: Trends and Challenges. Journal of Artificial Intelligence Research.
[3] Devlin, J., Chang, M.-W., Lee, K., & Toutanova, K. (2019). BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding. NAACL-HLT.
[4] Duolingo. (2023). Language Learning with AI. Duolingo Official Website.
[5] Microsoft. (2022). Microsoft Translator for Business. Microsoft Official Website.
[6] Singh, P., & Sharma, R. (2022). Natural Language Processing for Multilingual Education. Computational Linguistics Journal.
[7] UNESCO. (2023). Global Language Diversity Report. UNESCO Publishing.
[8] Zhao, L., & Chen, Y. (2021). Speech Recognition Using AI in Multilingual Contexts. Journal of Speech and Language Technology.