

Artificial Intelligence as a Catalyst for Overcoming Barriers to English Language Learning in Higher Education

Fawzi Alghazali¹ and Edward Hogshire²

Abstract

This study explores the transformative capacity of Artificial Intelligence (AI) to enhance the learning experiences of dyslexic students within English as a Second Language (ESL) classrooms, with reference to the domain of higher education. Dyslexia constitutes a distinctive obstacle to language acquisition, manifesting in persistent difficulties with reading, comprehension, and written expression; factors that collectively impede the academic progression of affected learners in ESL contexts. The emergence of AI-driven technologies presents innovative avenues for addressing these pedagogical challenges by offering personalized, adaptive, and learner-centered interventions. This study identifies substantive gaps within existing support mechanisms for dyslexic learners. It critically evaluates the pedagogical efficacy of AI applications such as speech recognition systems, natural language processing (NLP), and adaptive learning platforms in fostering language proficiency and academic achievement among dyslexic students. Furthermore, it examines selected case studies that demonstrate the practical integration of AI tools into ESL instruction, thereby providing actionable insights for educators and practitioners. While AI technologies offer significant advantages, including individualized learning trajectories and enhanced engagement, their adoption is accompanied by notable challenges. These encompass ethical considerations pertaining to data security, infrastructural and

1 Fawzi Alghazali is a professor of applied linguistics & Dean of the College of Arts & Languages at MBZUH.

2 Edward Hogshire is a lecturer of English language at MBZUH.

technological limitations, and the pressing need for sustained professional development of educators. The findings underscore a dual reality: AI has the capacity to substantially improve learning outcomes for dyslexic ESL students, yet it simultaneously raises complex questions regarding equity, privacy, and institutional readiness. Ultimately, this study calls for a collaborative framework uniting educators, policymakers, and technology developers to fully harness the potential of AI in advancing equitable educational opportunities for dyslexic students in ESL contexts.

Keywords: language barriers, language acquisition, language skills, artificial intelligence, natural language processing

INTRODUCTION

Dyslexia is a neurobiological learning disorder that influences academic accomplishment considerably, especially in higher learning institutions where language abilities are important. The International Dyslexia Association defines dyslexia as a learning disorder that primarily affects students' ability to decode new printed words, often involving issues with phoneme decoding, reading rate, and spelling. Such difficulties tend to be unpredictable, considering different cognitive skills and adequate classroom learning (Carroll et al., 2024). The learner who struggles with dyslexia is even worse off in English-as-a-second-language programs and settings. These involve low reading speed, poor understanding, misuse of writing, and overt errors that affect their learning and confidence (Elbeheri et al., 2019).

The theoretical perspective for dyslexic learners who are learning English as a second language is even more challenging due to the proven correlation between sound and letter patterns in English as a second language and phonological awareness (Rehman & Shah, 2023). Despite current strategies such as learning through multiple senses, many students require more personalized and differentiated assistance to effectively overcome these barriers. This makes it clear why there is a need to invest in research and development of interventions compatible with their requirements. AI as a model of education seems to be a possible approach to changing support structures for the dyslexic learner. Several technologies, such as voice recognition, NLP, and adaptive learning tools, can provide relevant and evidence-based support, thereby mitigating some of the flaws of conventional approaches (Crompton & Burke, 2023).

These tools engage users based on their learner profiles to offer specific activities that improve their language abilities and increase motivation and self-esteem (Kazu & Kuvvetli, 2023). However, the integration of AI also presents a number of challenges, such as the ethical issue of data privacy, the problem of emerging algorithmic bias, the uneven distribution of digital resources, and the issue of access to these resources, which contributes to the national digital divide (Kim, 2022).

This paper examines how dyslexic students of English as a Second Language can benefit from the use of advanced artificial intelligence tools, which can provide effective, formative, and scalable learning solutions. However, it is important to critically examine the ethical and technological aspects of AI implementation to ensure its pragmatism and fairness in this world.

LITERATURE REVIEW

Dyslexia and language learning

Olagboyega (2008) argued that each dyslexic learner possesses a distinct learning style, though many exhibit a tendency toward holistic rather than analytic processing. Dyslexic learners may respond more effectively to a „holistic/multi-sensory“ teaching approach that prioritizes contextualized language chunks over the mere analysis and compilation of grammatical and lexical lists, and incorporates visually oriented language tasks (p. 25). However, Olagboyega also identifies several challenges dyslexic learners of language may encounter. The foremost among these involves auditory processing, as dyslexic learners often struggle with phonological manipulation within words, rendering the association between letters and sounds particularly challenging. Additionally, Olagboyega observes that reading and copying from the board can be taxing, leading many dyslexic learners to prefer reading and writing with handouts to minimize distraction and maintain focus on the reading task. Further, difficulties often arise not only in processing and retaining information within short-term working memory but also in retrieving information from long-term memory. Handwriting and spelling frequently present difficulties for dyslexic language learners, with mind-mapping techniques such as spider-grams suggested as potentially supportive tools.

In a separate study, Knudsen (2012) identified two primary challenges for dyslexic foreign language learners: the intrinsic nature of dyslexia and the conventional methods of foreign language instruction in schools. Knudsen proposes a linkage between first- and second-language difficulties, noting that those diagnosed with dyslexia may experience decoding, encoding, phonological awareness, word retrieval, and syntax challenges in both their native and foreign languages. Sparks and Miller (2000) refer to this neurolinguistic condition as the Linguistic Coding Differences Hypothesis (LCDH). According to this hypothesis, native language processing challenges, though often subtle, may resurface in the context of foreign language learning for dyslexic learners (Schneider, 2009). In terms of instructional methodology, dyslexic learners often find it challenging to acquire a language through the same strategies that are effective for non-dyslexic learners. Typically, non-dyslexic students benefit from pedagogical frameworks

like Krashen's Natural Approach or Curran's Communicative Approach, which facilitate their immersion in a comprehensive linguistic environment. These approaches, however, may require adaptation to support dyslexic learners' integration within the language learning community.

Following this, researchers such as Arries (1999) argue for a reimagined approach to language instruction tailored to the needs and learning modalities of dyslexic learners. Arries contends that more than incremental teaching strategies are required; rather, a fundamental restructuring of the curriculum is essential to align with dyslexic learners' unique needs and cognitive styles. Similarly, Sparks and Miller (2000) advocate for the Multi-Sensory Learning Approach (MSL) as a particularly effective model for dyslexic language learners as it establishes associations between speech sounds and their written representations. Miles (1999, p. 131) recommends that educators employing the MSL approach identify the "smallest possible unit the child can handle," progressively reconstructing sequences from these foundational elements.

In a subsequent study, Sparks and Miller (2000) implemented various strategies combining sensory modalities to enhance foreign language acquisition. Some of these strategies were „segmenting words into distinct graphemes that students would first see, write, and pronounce simultaneously; prompting students to observe tongue placement for specific phonemes; breaking words into syllables with rhythmic tapping; color-coding vowels for clarity; color-coding conjugation changes; using flashcards for phoneme-grapheme associations; putting words into context with pictures; using metacognitive techniques to show similarities and differences between native and foreign languages; enacting vocabulary through movement; and using audio recordings during reading activities" (Sparks and Miller, 2000, p. 127). These methods suggest an ongoing need for innovative strategies supporting dyslexic learners' engagement with foreign language learning.

Artificial Intelligence (AI) in Education and English as a Second Language Learning

Crompton et al. (2023) underscore a burgeoning demand for integrating artificial intelligence (AI) into foreign language education, particularly for learners with dyslexia, over the past two decades. Large language models like Chat GPT, Google's Bard, and Microsoft's Bing Chat, which have revolutionized the educational field, are associated with this trend. Reviews of the AI found in educational settings reveal a budding appreciation for AI's possibilities. Crompton (2023, p. 9) identifies five critical areas in language education that AI can enhance: fluency of speech, written language, and reading; facilitation of language instruction; and self-managed, individual language acquisition. These applications also foster

learners' independence by empowering them to evaluate, contemplate, and control their own learning.

First, the study by Kazu and Kuvvetli (2023) reveals that AI can improve speaking skills by improving pronunciation in both British and American standards and offering a language teacher an intelligent conversation partner and a set of training aids. Further, it plays an active role in the automaticity of speech and voice analysis and recognition. In the current year's research by Kazu and Kuvvetli (2023), they introduce an AI-based pronunciation model for Turkish learners, allowing them to practice, record themselves, and receive feedback based on the analysed content. The outcomes of this intervention were positive; students enhanced their ability to remember words and identify consonant and vowel sounds.

Dizon and Gayed conducted an analysis of AI applications in teaching and learning writing skills, asserting that AI enhances the mastery of interior design and furniture names. Exterior design and furniture Establishing a framework for the writing task is crucial. Accessibility and feedback regarding writing tasks Checking grammar and spelling This aids in the translation process and guides students in structuring their writing. Chon et al. (2021) conducted a study to investigate the impact of AI in machine translation on supporting English as a second language writing among South Korean college students. The results suggest that Google Translate can help lower-skilled writers write at parity with higher-skilled writers. Furthermore, the analysis of students' essays revealed that the use of machine translation arguments significantly broadens their vocabulary, increases sentence complexity, and introduces more sophisticated, less frequently used words.

Tying AI to reading improvement and practices in acquiring and retrieving the vocabulary that are integrated with the words in gaming was a subject explored by Lee et al. (2023). The study monitored vocabulary learning through quests where English-speaking participants interacted with Japanese learners in a digital context, using English as the medium of communication. With avatars created to participate in WoW, students used semiotic means in external contexts to make meaning out of vocabulary. They assert that games afford a context for learning that many texts do not, and by doing so, support the use of vocabulary in an immersive AI environment like WoW, as NPCs and pathfinding algorithms, which are productive in learning.

AI is expanding the ways of teaching languages, as demonstrated by Kim (2022), who reviewed his use of AI to modify teaching techniques for Korean learners of the TOEIC. Subsequently to the diagnostic test, the AI adapted the lectures, descriptions, and quizzes based on each student's knowledge level. Lee et al. (2023) introduced a novel learning approach known as learner-generated context-based (LGC) learning, which utilizes digital technologies to enable students to engage in contexts created by their own utilization of learning content.

AI applications enable learner independence and self-regulated learning by allowing students to learn and practice languages at their own pace. These tools extend students' abilities to interface with and manage both the content of the course and personal observations, directions, and reactions. For instance, Hew et al. (2023) integrated chatbots into the English as a Second Language teaching-learning process to support learners in achieving their goals and enhancing their social presence in online learning environments. This assisted students in identifying their goals, planning for effective learning, and understanding the value of goal-directed learning. Chen et al. (2022) also examined the application of AI in robot-assisted language learning in virtual reality, utilizing robots to instruct English language tour guides. This method encouraged learner control and simultaneously increased motivation and learning engagement.

Based on this analysis, the application of AI in education with a focus on language education has moved from being a luxury to an absolute necessity. This is especially crucial for dyslexic learners, as they consistently exhibit unique cognitive traits and learning styles. We need to comprehend how dyslexic students can effectively advance through the English as a Second Language model and how we can incorporate new technologies, such as AI and language learning platforms, into this endeavor. While the use of AI technologies in language education is growing, our understanding of how dyslexic English as a Second Language learners can benefit from these technologies in the future remains inadequate. This research directly addresses these knowledge gaps by analyzing the potential of generative AI applications to enhance learning English as a second language among dyslexic students. This research provides valuable insights and a framework for implementing AI technologies in English as a Second Language instruction, enabling ELT practitioners to identify the most effective methods for integrating AI technology into the English as a Second Language learning environment. This section will delve deeper into specific solutions, such as XYZ.

CHALLENGES FACED BY DYSLEXIC LEARNERS IN ENGLISH AS A SECOND LANGUAGE CLASSROOMS

Cognitive and Linguistic Barriers

Learners with dyslexia face significant and aspirational barriers, as well as pervasive learning difficulties, when preparing to acquire a second language. One can identify a significant issue known as phonological processing, which refers to disruptions in the recognition or manipulation of individual phonemes. Olagboyega (2008) holds the opinion that these deficits are worse in languages such as English, which have poor and irregular phoneme-grapheme mapping. This

observation cautions that educators should not rely solely on phonics approaches that may not adequately meet the processing requirements of dyslexic students. Furthermore, Knudsen (2012) underscores the interplay between phonological processing issues and weak working memory impairments, which significantly hinder dyslexic learners' ability to attain and maintain sufficient reading and writing speed. I conclude from these findings that the conventional English as a Second Language curricula with rote memorization and drill repetition may, in fact, be developmentally incongruous with dyslexic learners.

Despite their significant impact on language proficiency, dyad partners often overlook the difficulties in syntax and grammar that dyslexic English as a Second Language students face. It's also clear from Sparks and Miller's (2000) Linguistic Coding Differences Hypothesis (LCDH) stages that these problems are not unique. They are part of a neurolinguistic disorder that affects both learning a first language and a second language. This hypothesis challenges the misconception that accommodating the dyslexic learner only necessitates minor adjustments to the existing teaching and learning environment, as it actually demands a comprehensive overhaul of the current teaching strategies. Each of these findings as a whole indicates that the existing educational methods and practices are inefficient in helping dyslexic English-as-a-second-language learners overcome a primary severe learning disability.

Academic and Emotional Impacts

These barriers have a significant and intricate impact on the academic performance of students receiving scholarships. Philip (2019) explains that many attribute low academic achievement among dyslexic learners to a behavior they perceive as a weakness in effort and ability. This misinterpretation not only deepens problems for students in academic performance but also destroys their motivation to learn and their self-esteem. Saxena et al. (2024) offer a second critical perspective on the emotional ramifications, emphasizing the sense of helplessness that results in a lack of learning orientation. The students conceive language deficits as inevitable. This observation suggests that repeated academic failures leave a learner emotionally barren and disengaged from the process of learning. This section will further elaborate on solutions, including XYZ.

This is why it becomes clear that educators need to develop better approaches to the psychological cost imposed by the language learning process on dyslexic children. Additionally, the role of the social-emotional dimension of dyslexia in English as a Second Language backgrounds is not being addressed. Arries (1999) clarified that students expressed a sense of isolation, which they believed could be alleviated by implementing the anxiolytics they desired in the classroom. Garcia's

paper asserts that the issue extends beyond academic underachievement. As a result, the literature details a combined approach focusing on the dyslexic English as a Second Language learners' academic and affective needs.

Current Interventions and Limitations

Despite awareness of these challenges, existing support structures are significantly inadequate. Sparks and Miller (2000) assert that while accommodations like extra time for tests can be beneficial, they fail to address the core causes of dyslexia, which are phonological and cognitive disabilities. Such a critique is significant as it highlights the fragmentation that exists between the current support measures and their implementations. Knudsen (2012) also raises concerns about the old methods of teaching English as a second language, noting that these methods slow down the learning processes of dyslexic learners by associating writing with grammar and memorization, which only exacerbates the situation. Collectively, these studies urge scholars to rethink the assumptions and delivery methods of support.

Despite the potential, educational institutions apply approaches like text-to-voice software rather irregularly. Despite the effectiveness of targeted context-based interventions, schools and teachers rarely implement them due to limited resources and training, according to Wong et al. (cited in Sparks & Miller, 2000). This critique highlights the structural factors that impede the growth of technological interventions. More importantly, there is no full-fledged training of English as a Second Language facilitators with a view to preparing them aptly to the needs of a dyslexic child, and thus current measures contain an endorsement that is not efficient. Therefore, there is a need to embrace research-based, individualized, and adequately funded approaches that enhance the learning of dyslexic learners in English as a Second Language classes.

AI-DRIVEN TOOLS FOR SUPPORTING DYSLEXIC ENGLISH AS A SECOND LANGUAGE LEARNERS

Speech Recognition Technology

Recent studies of speech recognition technology have discovered a way of assisting dyslexic English as a Second Language learners in reading and writing since this technology has proven to act as a cornerstone in providing dyslexic English as a Second Language learners with reading-writing discovery. These tools relieve students from the endless writing process, particularly during discussions and debates, by converting spoken language into text. Kazu and Kuvvetli (2023) noted

that speech recognition software significantly enhances students' writing abilities by eliminating the need for spelling and letter sequences.

This technology is crucial for dyslexic learners who struggle with phonological processing, as it facilitates their learning by allowing them to utilize their preferred communication method. Moreover, the technology offers functions like automatic pronunciation checking, which provides feedback for practice. This can develop students' speaking skills in English, benefiting language acquisition. However, the ability of these tools to narrow dialect and accent differences remains a concern, particularly in multilingual and multicultural English as a Second Language settings.

CONCLUSION

This paper addresses the challenges faced by dyslexic learners in ESL classrooms by incorporating actionable recommendations. It balances the discussion of AI integration while highlighting ethical and feasibility concerns. By linking these tools to specific case studies, it provides a practical framework for stakeholders to implement equitable and effective solutions.

Fawzi Alghazali and Edward Hogshire

Mohamed Bin Zayed University for Humanities, UAE
fawzi.alghazali@mbzuh.ac.ae; edward.hogshire@mbzuh.ac.ae



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Umetna inteligenca kot katalizator za premagovanje ovir pri učenju angleškega jezika v visokem šolstvu

Študija raziskuje transformativno sposobnost umetne inteligence (AI) za izboljšanje učnih izkušenj disleksičnih študentov pri pouku angleškega jezika kot drugega jezika (ESL) na področju visokega šolstva. Disleksija predstavlja posebno oviro pri učenju jezika, ki se kaže v vztrajnih težavah pri branju, razumevanju in pisnem izražanju; ti dejavniki skupaj ovirajo akademski napredek prizadetih učencev v kontekstu ESL. Pojav tehnologij, ki temeljijo na AI, ponuja inovativne poti za reševanje teh pedagoških izzivov, saj omogoča prilagojene in na učenca osredinjene intervencije. Študija ugotavlja bistvene vrzeli v obstoječih mehanizmih podpore za disleksične učence. Kritično ocenjuje pedagoško učinkovitost aplikacij umetne inteligence, kot so sistemi za prepoznavanje govora, obdelava naravnega jezika (NLP) in prilagodljive platforme za učenje, pri spodbujanju jezikovne usposobljenosti in akademskih dosežkov med učenci z disleksijo. Poleg tega preučuje izbrane študije primerov, ki prikazujejo praktično vključevanje orodij umetne inteligence v poučevanje ESL, s čimer zagotavlja uporabne vpoglede za učitelje in strokovnjake. Čeprav tehnologije umetne inteligence ponujajo pomembne prednosti, vključno z individualiziranimi učnimi metodami in večjo vključenostjo, njihovo uvajanje spremljajo tudi pomembni izzivi. Ti vključujejo etična vprašanja v zvezi z varnostjo podatkov, infrastrukturne in tehnološke omejitve ter nujno potrebo po trajnem strokovnem razvoju učiteljevev. Ugotovitve poudarjajo dvojno realnost: umetna inteligenca ima sposobnost bistveno izboljšati učne rezultate disleksičnih učencev ESL, hkrati pa sproža kompleksna vprašanja glede enakosti, zasebnosti in institucionalne pripravljenosti. Študija poziva k sodelovalnemu okviru, ki združuje učitelje, oblikovalce politik in razvijalce tehnologije, da bi v celoti izkoristili potencial umetne inteligence pri spodbujanju enakih izobraževalnih možnosti za disleksične učence v kontekstu ESL.

Ključne besede: jezikovne ovire, pridobivanje jezikovnih znanj, jezikovne spretnosti, umetna inteligenca, obdelava naravnega jezika