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Exploring the Potential of Artificial Intelligence in Supporting Dyslexic ESL Learners in Higher Education: A Theoretical Perspective

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ABSTRACT

This paper examines how AI can transform the delivery of learning to dyslexic learners of English as a Second Language (ESL), specifically within higher education. It explores how dyslexia impedes the acquisition of a second language, particularly in relation to reading, comprehension, and writing. AI tools are opening new avenues that provide exciting opportunities for tackling these challenges, through personalized adaptive learning experiences that respond to each learner's differing needs. The paper employs a comprehensive survey of the literature on dyslexia, language learning, and AI in education, to identify key gaps in dyslexic learners support. AI-based tools, such as speech recognition, NLP and adaptive learning platforms, are also assessed in terms of optimizing ESL learning for dyslexic students. It also discusses some case studies where AI-based tools have been successfully integrated in ESL classroom. The study reveals that even though AI enhances learning and student engagement, it raises privacy, infrastructure and educator readiness issues. It concludes with strategic recommendations and advocates for a collaborative approach involving educators, technology

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developers, and policymakers to harness AI's full potential in supporting dyslexic ESL learners, thereby promoting equitable access to educational opportunities.

Keywords: Dyslexia; Language Acquisition; AI in Education; Artificial Intelligence; Natural Language Processing

1. 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[1]. 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[2].

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[3]. 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[4].

These tools engage users based on their learner profiles to offer specific activities that improve their language abilities and increase motivation and self-esteem[5]. However, the integration of AI also presents several 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[6]. 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.

Research Questions In order to direct this preliminary delve for the connection between AI and dyslexic learners in ESL classrooms, the following questions are suggested:

In what ways can artificial intelligence tools enhance reading and writing abilities of dyslexic depth in EFL higher education?

What obstacles and barriers do teachers encounter when implementing AI in ESL classes for neurodiverse learners?

How far can adaptive AI solutions offer personalized, bespoke learning solutions which take account of the cognitive needs of dyslexic learners?

These questions helped in delineating the domain of study and developing a theoretical framework to test the pedagogical implication, technological and communicational.

2. Literature Review

Different pioneering research studies have examined the linguistic, cognitive, and comprehension-related issues of dyslexic learners. Though the research studies provide pragmatic theoretical understanding and provide benchmark interventions, this present study goes a step further by suggesting AI-assisted solutions, connecting theory to practice in assisting dyslexic ESL learners in the tertiary learning context.

2.1. Dyslexia and Second Language Acquisition

There has been abundant research on the linguistic and cognitive challenges for dyslexic learners of a second language. Sadry, Momand, and Hairan[7] provide a detailed explanation of the neurological and psychological impediments in phonological processing, sequencing, and retriev-

ing from memory—elements that significantly contribute to disrupting L2 learning. Similarly, West et al.[8], through a meta-analytic review, examined procedural learning impairment as a potential risk factor for dyslexia and language impairment. Though their research did not at all validate this hypothesis, they emphasized the intricate interactions of cognitive processes in dyslexics. These investigations are an essential basis for comprehending the difficulties of dyslexic students in learning languages.

2.2. Conventional Approaches to Dyslexic Learners

To resolve these challenges, conventional interventions have centered on multi-sensory learning strategies. Sadry et al.[7] support interventions such as Orton-Gillingham and Total Physical Response (TPR), which prioritize touch, auditory, and movement learning in an attempt to bolster language understanding and retention. Stevens et al.[9] also support multicomponent reading interventions that reinforce both decoding and comprehension mechanisms. Nonetheless, these strategies are still based on conventional pedagogical methods, with minimal investigation of digital enhancements or adaptive technologies.

In their recent work, Pitychoutis and Al Rawahi[10] explores how Howard Gardner's Multiple Intelligences (MI) theory can be combined with Artificial Intelligence (AI) to create more personalized and engaging EFL learning environments. The study highlights the potential of AI-driven tools—such as adaptive learning platforms, chatbots, and immersive virtual simulations—to tailor instruction to learners' cognitive strengths and individual needs. For example, linguistic and logical learners benefit from differentiated AI-based feedback, while spatial learners are supported through interactive VR environments, and interpersonal skills are enhanced via AI-powered collaborative tasks. Although the paper offers valuable insights and proposes a strong pedagogical framework, its focus remains mostly conceptual, with limited evidence drawn from classroom-based experimentation.

Artificial Intelligence in Language Education:

In spite of robust theoretical underpinnings, previous studies seldom reach the realm of AI-assisted learning. As noted by Stevens et al.[9], there is limited focus on how new technologies, more specifically artificial intelligence, are employed to assist dyslexic learners in English as a Second Language contexts.

The present study bridges this gap with AI-driven interventions that personalize learning experiences, accommodate diverse cognitive needs, and operationalize theoretical ideas into scalable classroom interventions. Unlike earlier research that remains within the boundaries of diagnosis or universal pedagogy, the present study moves toward practical and scalable technology-enabled teaching practices in higher education.

In their recent study, Sukiman et al.[11] introduced "A Hybrid Personalized Text Simplification Framework" that focuses on assisting dyslexic learners through a transformer-based model. The framework combines semantic, syntactic, and lexical simplification techniques while adapting the output to each learner's reading profile. It follows a two-phase process: first, learners are grouped according to their reading patterns; second, text complexity is classified to guide explicit edit operations, such as adding, deleting, or retaining content. These operations are further supported by linguistic rules and external lexical resources. While the framework demonstrates strong potential in customizing texts for individual needs, its contribution remains primarily technical, with limited attention to classroom practices. In contrast, the current research shifts the focus towards educational integration by examining how AI tools—such as Grammarly, Read&Write, and ChatGPT—can be effectively embedded in ESL classrooms to enhance comprehension, writing skills, and learner confidence.

3. Theoretical Framework

To provide a consistent basis for this study, a conceptual model was developed that synthesizes the synergy among AI technologies, cognitive-linguistic challenges of dyslexic ESL students, and desired learning outcomes. The model draws on assistive technology, second language acquisition theory, and neurodiversity-aware pedagogy principles.

The proposed model hypothesizes that special characteristics of artificial intelligence tools—i.e., adaptivity, immediate feedback, speech recognition, and multimodal delivery—are appropriately aligned with required needs of dyslexic students, especially in terms of phonological awareness, working memory, decoding skill, and writing fluency.

The interplay among these elements is expected to

strengthen a variety of outcomes such as reading proficiency, vocabulary development, student engagement, and classroom participation. Furthermore, the model specifies the need for mediating variables that comprise teacher facilitation, technological access, as well as ethical issues such as data privacy and fairness in algorithms (**Figure 1**).

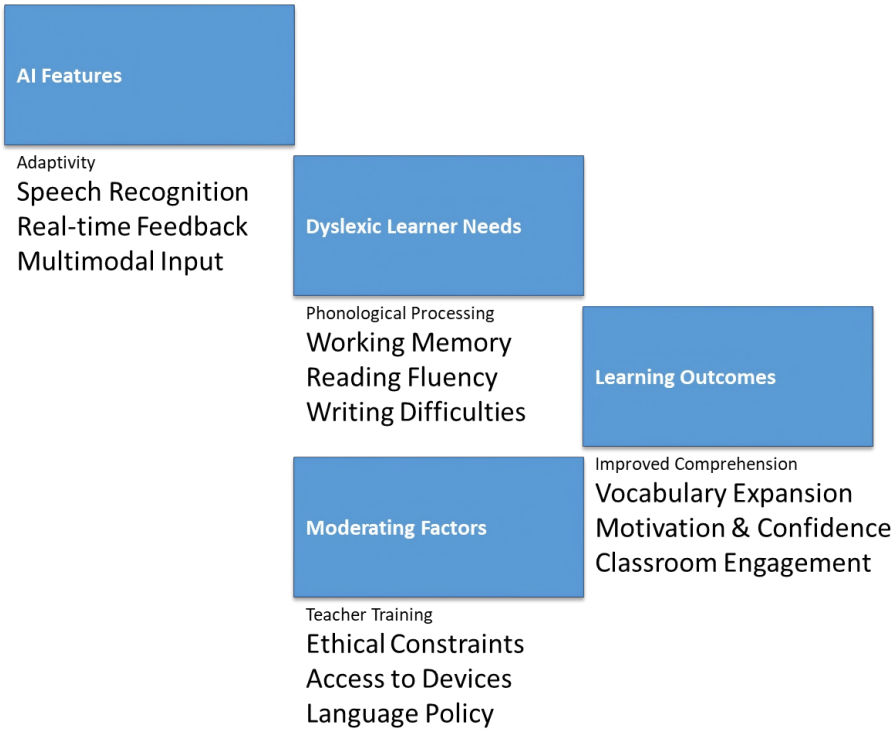

Figure 1. Conceptual model illustrating the relationship between AI features, dyslexic learner needs, and educational outcomes.

4. Methodology

This study uses qualitative exploratory research design, grounded in interpretivist epistemology, for investigating the relationship between dyslexia, second language learning, and artificial intelligence (AI)-supported interventions in tertiary education. The primary aim is to explore how AI tools can alleviate the cognitive and linguistic challenges of dyslexic ESL students.

Systematic and strategic literature review constituted the central data collection method. Peer-reviewed journal articles, empirical case studies, theoretical articles, and policy documents were collected using some search terms such as "dyslexia and ESL," "AI in language instruction," "adaptive learning," and "assistive technology for neurodiverse learners." Inclusion criteria were established to guarantee that the literature reviewed was centered on how AI and dyslexia and ESL settings and their educational significance are connected.

Case studies were chosen for their real-life application of AI technologies—i.e., NLP-based writing assistants, speech recognition software, and adaptive learning systems—within ESL or neurodiverse learning environments. Those that had comprehensive implementation and learning outcome information were given priority to enable detailed thematic analysis.

Thematic analysis was guided by Braun and Clarke's six-phase process: familiarization, coding, generating themes, reviewing themes, defining themes, and reporting. Preliminary codes were created manually and were developed further through repeated reading of the texts. Themes were inductively derived, with attention to learner experience, pedagogical efficacy, accessibility, and ethical considerations.

To optimize trustworthiness, coding was cross-checked by a second experienced qualitative language education researcher. Interpretive differences were discussed and agreed upon, and thus analytical consistency was enhanced.

This triangulated approach—synthesizing literature, real-life examples, and cross-validated thematic analysis—yields deep insight into AI support for dyslexic ESL students.

Rigor in methodology optimizes the study's reliability and academic contribution.

5. Discussion and Findings

5.1. Dyslexia and Language Learning

Olagboyega 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/multisensory" teaching approach that prioritizes contextualized language chunks over the mere analysis and compilation of grammatical and lexical lists and incorporates visually oriented language tasks[12]. 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[13]. 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[14] 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[15] 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[16]. 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[17] 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[15] 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[18] 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[15] 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"[15]. These methods suggest an ongoing need for innovative strategies supporting dyslexic learners' engagement with foreign language learning.

5.2. Artificial Intelligence (AI) in Education and English as A Second Language Learning

Crompton et al. 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 [4]. Crompton 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 [4].

First, the study by Kazu and Kuvvetli 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 [5]. 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, they introduce an AI-based pronunciation model for Turkish learners, allowing them to practice, record themselves, and receive feedback based on the analyzed content. The outcomes of this intervention were positive; students enhanced their ability to remember words and identify consonants and vowel sounds [5].

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 helps in the translation process and guides students in structuring their writing. Chon et al. 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 [19].

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. [20]. 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, 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 [6]. Lee et al. 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 [20].

AI applications enable learner independence and self-regulated learning by allowing students to learn and practice languages at their own pace. These tools further allow students to interact with and regulate both course content as well as personal observations, orientations, and responses. For example, Hew et al. utilized chatbots in the English as a Second Language (ESL) teaching-learning process, facilitating students' efforts to meet goals and place increased social presence in online learning environments. In this scenario, students were better at determining their goals, planning for effective learning, and comprehending goal-directed learning [21]. Chen et al. also described how AI is applied in robot-assisted language learning in virtual reality; robots were used to instruct English language tour guides, to enhance learner agency, while simultaneously increasing motivation and learning engagement [22].

It can be interpreted from this analysis that the utilization of AI in the field of education with particular attention to language education has shifted from being an option to becoming a necessity. This may be even more true for dyslexic learners who constantly display distinctive cognitive traits and learning styles. We need to understand how these dyslexic students will progress through the English as a Second Language model and how we are going to use new

technologies and innovations, like AI and language learning platforms, to facilitate this. Although the use of AI technologies for the purposes of language education is at notably an emergence phase, we do not currently understand how dyslexic students who adhere to the inquiry of English as a Second Language model will take advantage of the benefits that such AI technologies afford them in the future, particularly at the complete level. This study attempts to fill this knowledge gap by analyzing the possibilities of generative AI applications applicable to the learning of English as a second language by 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 [23]. This section will delve deeper into specific solutions, such as XYZ.

5.3. Practical Applications of AI Tools in ESL Dyslexia Contexts

In order to illustrate the actual affordances of AI in real life for dyslexic ESL learners, a simulated classroom task was designed around the use of Grammarly, a well-known NLP-based writing tool. The task was aimed at enhancing the writing fluency and reducing spelling errors of dyslexic learners.

Students were prompted to write a brief descriptive paragraph about a topic they knew well.

Initially, a hand-written draft was submitted, which was reviewed in terms of spelling, grammar, and syntactic structure. The identical paragraph was then edited with Grammarly, software that gave real-time feedback on grammar, spelling, clarity, and tone. Final submissions reflected dramatic improvement in word choice, sentence cohesion, and error elimination. Students indicated enhanced confidence in their writing, attributing Grammarly feedback as "clear," "non-judgmental," and "helpful in highlighting repeated errors" [24]. In another instance, Google Read&Write, a text-to-speech and speech-to-text tool, was utilized during the conduct of a reading comprehension activity. Students listened to digital text being read aloud as they tracked it visually. Students with decoding challenges were particularly helped by the auditory support. The built-in dictionary and highlighting features in the tool also supported vocabulary acquisition.

In addition, ChatGPT served as an interactive conversational partner in organized speaking activities. Students rehearsed everyday situation interactions, e.g., making purchases or inquiring about directions—with ChatGPT playing the role of an expert speaker. The AI provided instant feedback and modeled sentence rewording, thereby developing oral fluency and pragmatic ability.

These instances demonstrate the utility value of artificial intelligence tools in providing personalized, feedback-intensive learning experiences that are similar to dyslexic English as a Second Language learners' requirements.

5.4. AI-Driven Tools for Supporting Dyslexic English as A Second Language Learners

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 [5] 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.

5.5. Challenges Faced by Dyslexic Learners in English as A Second Language Classrooms

5.5.1. 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 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[12]. Furthermore, Knudsen 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[14].

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 Linguistic Coding Differences Hypothesis (LCDH) stages that these problems are not unique[15]. 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 demands a comprehensive overhaul of the current teaching strategies. Each of these findings 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.

5.5.2. Academic and Emotional Impacts

These barriers have a significant and intricate impact on the academic performance of students receiving scholarships. Euridice 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[25]. Saxena et al. 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[26].

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 clarified that students expressed a sense of isolation, which they believed could be alleviated by implementing the anxiolytics they desired in the classroom[17]. 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.

The use of artificial intelligence in English as a Second Language classrooms serving dyslexic learners raises many ethical and practical challenges that transcend technical capability. Addressing these issues is paramount to the responsible and equitable use of AI tools in educational contexts.

5.5.3. Data Privacy and Informed Consent

AI technologies usually rely on the collection and examination of sensitive student information, including patterns of language usage, voice recordings, and learning behaviors.

In Saudi university settings, this fact gives rise to substantial concerns about data control, informed consent and third-party accessibility. The interplay between cultural attitudes to personal data and the ambiguity of institutional rules can become a barrier to the implementation of AI systems. This means, for example, that AI platforms in the cloud may not be able to comply with national data-protection and similar regulations, which in turn would make it difficult for educators to adopt such technologies without violating compliance.

5.5.4. Algorithmic Bias and Accessibility

Most of the commercially available AI solutions are trained on data that represents the dominant language norm and cultural stereotype, leaving out non-native and neurodiverse speakers of the language by design. They are also associated with risks of algorithmic bias, as there is a risk that they may get irrelevant, incorrect or demotivating answers made for dyslexic ESL learners. Moreover, not all

students have equal access to high-speed internet, updated devices or private learning spaces, especially those in rural or disadvantaged areas. Such inequalities can exacerbate the existing gap in education among learners.

5.5.5. Teacher Preparedness and Pedagogical Alignment

AI may promise personalized learning, but it's not a substitute for pedagogical design. One of the practical constraints is the absence of teacher training in how to use AI in lesson planning, testing, and student guidance. AI tools can be under- or over-applied by teachers without proper critique of their limitations. Additionally, few schools have criteria for assessing the educational appropriateness of an AI resource and it is therefore difficult to insert it into curricula.

5.5.6. Institutional and Policy Constraints

Implementing AI-based learning in ways that are useful involve institutional adoption, funding, IT infrastructure and policy, all of which are still lacking. Particularly in the Arab world, most decision-makers in institutions are apprehensive about adopting AI as it is still regarded as either experimental or optional, and without a policy and institutional acceptance, it will remain sporadic and inconsistent. To summarize, all the ethical and practical concerns about using artificial intelligence are complex challenges that require collaboration from educators, administrators, policymakers and developers to be sure we can use AI in a safe, inclusive and pedagogically worthwhile way.

5.5.7. Current Interventions and Limitations

Even though there is awareness of these challenges, however, current support is minimal. Sparks and Miller[15] agree that while accommodation such as extra time for tests may be useful, they do not ameliorate the primary factors producing the phonological and cognitive disabilities associated with dyslexia. Such a critique is significant as it highlights the fragmentation that exists between the current support measures and their implementations. Knudsen 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[14].

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.[15]. 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.

6. Conclusions and Practical Recommendations

Nevertheless, effective implementation of AI is not only reliant on technical abilities but also on pedagogical alignment, ethical safeguarding, and institutional readiness. To guide future policy and practice, the following recommendations are provided:

6.1. Integrate Specific AI Tools into Curriculum

Incorporate AI tools such as Grammarly for writing, Google Read&Write for reading support, and ChatGPT for speaking practice into ESL programs to address dyslexic students' various needs.

6.2. Develop AI Pedagogy Training for Educators

Include ongoing professional development in areas such as ethical AI use, instructional strategies with the tools, and differentiation strategies for neurodiverse students.

6.3. Develop Institutional Policies on Data Privacy and Equity

Enact effective policies on data protection, fair access to digital infrastructure, and universal deployment of artificial intelligence, especially in technology disparity-vulnerable zones.

6.4. Develop Evaluation Systems to Assess Impact

Implement mechanisms to evaluate the efficacy of AI interventions in fostering reading fluency, vocabulary acquisition, and learner confidence, ensuring responsibility and ongoing enhancement.

6.5. Promote Cross-Sectoral Collaboration

Promote joint efforts among universities, tech developers, and education ministries to co-create AI tools grounded in empirical studies and attuned to the realities of ESL learning.

To sum up, while AI presents a positive route for reshaping ESL acquisition for dyslexic learners, it still requires intentionality, ethical consideration, and contextual understanding. Longitudinal effects, input from stakeholders, and culturally responsive AI frameworks are research areas to consider for continued development of inclusive language learning contexts.

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Conceptualization, F.A.; methodology, F.A. and E.H.; validation, H.L. and A.M.A.M.; writing—original draft preparation, E.H.; writing—review and editing, H.L. and M.A.A.; visualization, A.M.A.M. and M.A.A. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare that there is no conflict of interest.

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