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# NeuroLearn - An Inclusive Educational Platform for Dyslexic Learners

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***Abstract: Dyslexia is one of the most common learning disabilities that affects a lot of kids in school. Even though more people know about it, many cases still go undiagnosed or don't get enough help, which leads to academic problems and emotional pain. This paper talks about NeuroLearn, an AI-powered educational platform that aims to fill this gap by allowing early dyslexia screening, personalized learning support, and mental health features that are built into the platform. NeuroLearn wants to give dyslexic students power by creating a digital environment that is holistic, welcoming and easy to use. It does this by using assistive technology, gamified assessments and smart analytics.***

***Keywords: AI-driven education, Personalized learning, Dyslexia detection, Neurodivergent support, Assistive technology.***

## I. INTRODUCTION

Dyslexia is a neurodevelopmental disorder that makes it hard to read words correctly and/or quickly, spell them correctly, and decode them. About 10–15% of people around the world are thought to have it. Even though dyslexia is common, it often goes undetected until a child fails at school in a big way, which can have long-term effects on their mental health, like low self-esteem, anxiety, and social withdrawal.

Early screening tools are often missing or difficult to use in many schools, and many teachers are not sufficiently trained to spot early signs of dyslexia. Most e-learning platforms concentrate on delivering content rather than addressing the unique neurocognitive needs of learners. As a result, they usually lack structured screening features, personalized learning pathways, and mental wellness support that are essential for students with neurodivergent profiles.

Schools often don't have the right tools or trained staff to spot dyslexia early on, especially in areas with few resources. Also, most digital learning platforms don't meet the specific cognitive needs of dyslexic students or provide mental health support as part of the learning experience.

To deal with these problems, we created NeuroLearn, an all-inclusive educational platform that has AI-powered early screening tools, dyslexia-friendly learning modules, and mental health features. This paper talks about how NeuroLearn was designed, built, and how it could help dyslexic students find problems earlier, do better in school, and become more emotionally strong.

## II. LITERATURE REVIEW

Early identification is crucial for effective dyslexia intervention. Shaywitz and Shaywitz (2003) showed that neurological signs of dyslexia can appear even before children begin formal schooling. Snowling and Hulme (2012) highlighted the importance of phonemic awareness and rapid automatized naming (RAN) as reliable components of screening methods.

Multisensory approaches such as the Orton–Gillingham method remain central to structured literacy instruction. These techniques use a combination of visual, auditory, and kinesthetic inputs to reinforce learning. However, they often require highly trained instructors and one-on-one sessions, which limits their scalability in classroom settings.

Educational technology has expanded access to tools like adaptive learning systems and text-to-speech or speech-to-text features, which help reduce cognitive load for learners. Research by Al-Azawei et al. (2017) found that students with learning disabilities benefit significantly from platforms designed with Universal Design for Learning (UDL) principles.

Emotional well-being is also a critical concern. Livingston et al. (2018) reported higher levels of anxiety, frustration, and depression among dyslexic learners, underscoring the need for support that goes beyond academics.

While previous studies have addressed screening, multisensory instruction, accessibility, and emotional health separately, few solutions integrate all these components. NeuroLearn aims to close this gap by combining them into a unified platform.

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## III. METHODOLOGY

NeuroLearn is a full educational platform that includes early screening, adaptive learning, and emotional support for students with dyslexia. Accessibility, personalization, and inclusivity are the main ideas behind the platform.

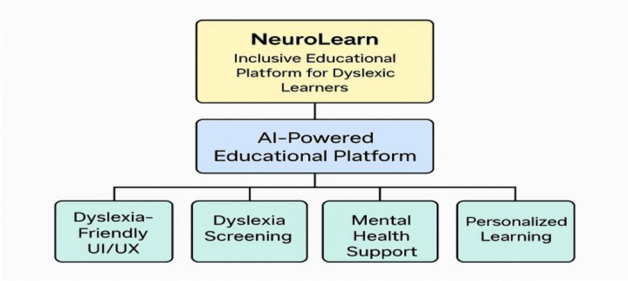



Fig.1. System architecture overview of the platform which includes its main modules: a dyslexia-friendly user interface, an early screening system, built-in mental health support features, and a personalized learning component.

### *A. System Design*

The architecture has a modular frontend, AI-enabled backend services, and storage in the cloud. The frontend is built with HTML, CSS, and JavaScript to make sure that the user interface is responsive and easy to read for people with dyslexia. Python Flask powers the backend, which takes care of processing data, managing users, screening analytics, and making AI-based recommendations.




Fig. 2. Workflow diagram of the platform that shows the user's path from accessing the dyslexia-friendly interface to completing screening assessments and engaging with interactive learning modules. This flow highlights how users move through the system in a clear and supportive manner.

### *B. Module for Dyslexia Screening*

A gamified screening system tests important skills like phonological awareness, working memory, visual discrimination, and reading fluency. The tests are short, fun, and easy for kids to use. An AI model that has been trained to find signs of dyslexia processes the results and makes a personalized report with suggested next steps.

### *C. Customized Learning Paths*

The platform creates personalized learning paths based on screening results and ongoing interactions with learners. Lessons are broken up into small chunks and use audio, text, and images to engage students' senses. AI models look at engagement and progress to change the level of difficulty in real time.

### *D. Help with mental health and emotions*

NeuroLearn has a built-in mood tracker and journal. Students can use short text messages or emojis to write down how they feel. There are guided mindfulness exercises and games to help you relax. OpenAI powers an AI chatbot that gives emotional support outside of therapy and connects users to helplines when they need them.

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### *E. Features for Access*

To make things easier for people to understand, the platform uses Open Dyslexic fonts, lets users change the size and color of the text and background, and has simple layouts. Text-to-speech (TTS) and speech-to-text (STT) features help people who learn by hearing and speaking.

### *F. Learning Modules with Games*

NeuroLearn has interactive phonics drills, word games, and storytelling exercises to keep kids interested and lower their anxiety about learning. Badges and rewards help people make progress.

### *G. Ethics and Privacy of Data*

End-to-end encryption keeps user data safe, and AI model training uses anonymized data. Guardians must give permission for children under 13. All mental health tools are not clinical and are only meant to help.

This combined approach makes sure that NeuroLearn not only finds dyslexia early, but also helps students learn in a way that is tailored to their needs and emotionally supportive.

## IV. RESULTS AND DISCUSSIONS

A small group of students, teachers, and parents were the first to try out and test NeuroLearn. People were asked for their thoughts on how easy it was to use, how engaging it was, and how useful they thought the screening and support features were.

Testers liked the dyslexia-friendly UI, especially the ability to change the fonts and add audio narration.

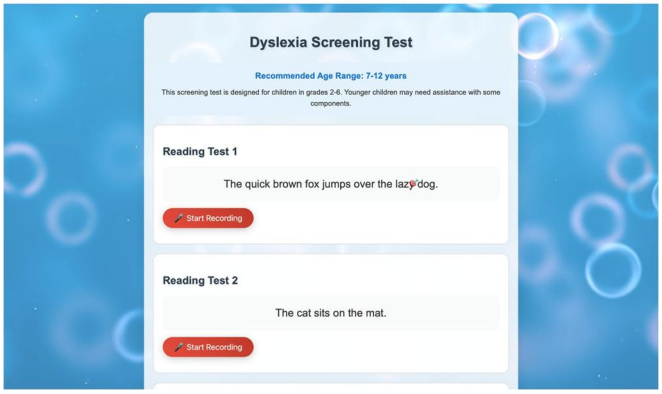



Fig. 3. Dyslexia Screening Test interface displaying reading assessment tasks with audio recording

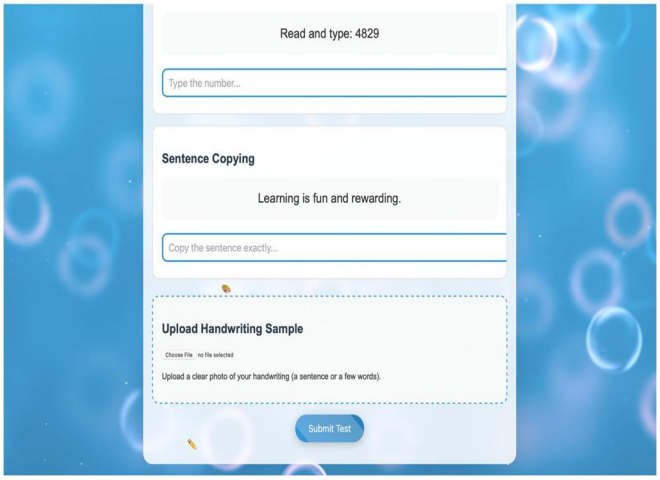



Fig. 4. Dyslexia Screening Test interface showing number typing, sentence copying and handwriting sample upload sections

1) Screening Accuracy: The first tests of the gamified dyslexia assessment matched up well with what teachers saw, showing that it might be possible to find at-risk students early on.
2) Engagement: The gamified modules and reward system worked to keep learners interested and lower their anxiety about reading.
3) Mental Health Tools: Parents especially liked the journaling and mood tracker features because they helped them keep an eye on their children's emotional trends.

Current limitations include the small number of participants in the pilot study, the platform's limited language options, and the need for larger and more diverse datasets to further improve the accuracy of the AI model.

These results show that NeuroLearn can be used as a complete educational and support tool. More testing with a wider range of people and formal clinical studies will make the platform more reliable and able to handle more users.

## V. FUTURE SCOPE

We plan to make the following changes and additions to NeuroLearn to make it even better:

1) Clinical Trials and Validation: Working with educational psychologists to make sure the screening tool works for people of all backgrounds.
2) Multilingual Support: Adding options for regional languages to make it easier for more people to use.
3) Teacher Integration Module: This lets teachers keep track of how well their students are doing, add notes, and get suggestions for what to do next.

Adding support for ADHD, dysgraphia, and other learning disorders.

Partnerships between the government and NGOs: For large-scale use in rural and underserved areas

## VI. CONCLUSION

NeuroLearn is a smart way to help dyslexic students deal with the many problems they face. NeuroLearn meets all of a child's academic, emotional, and developmental needs by combining AI-powered early screening, multisensory learning tools, and mental health support into one easy-to-use platform.

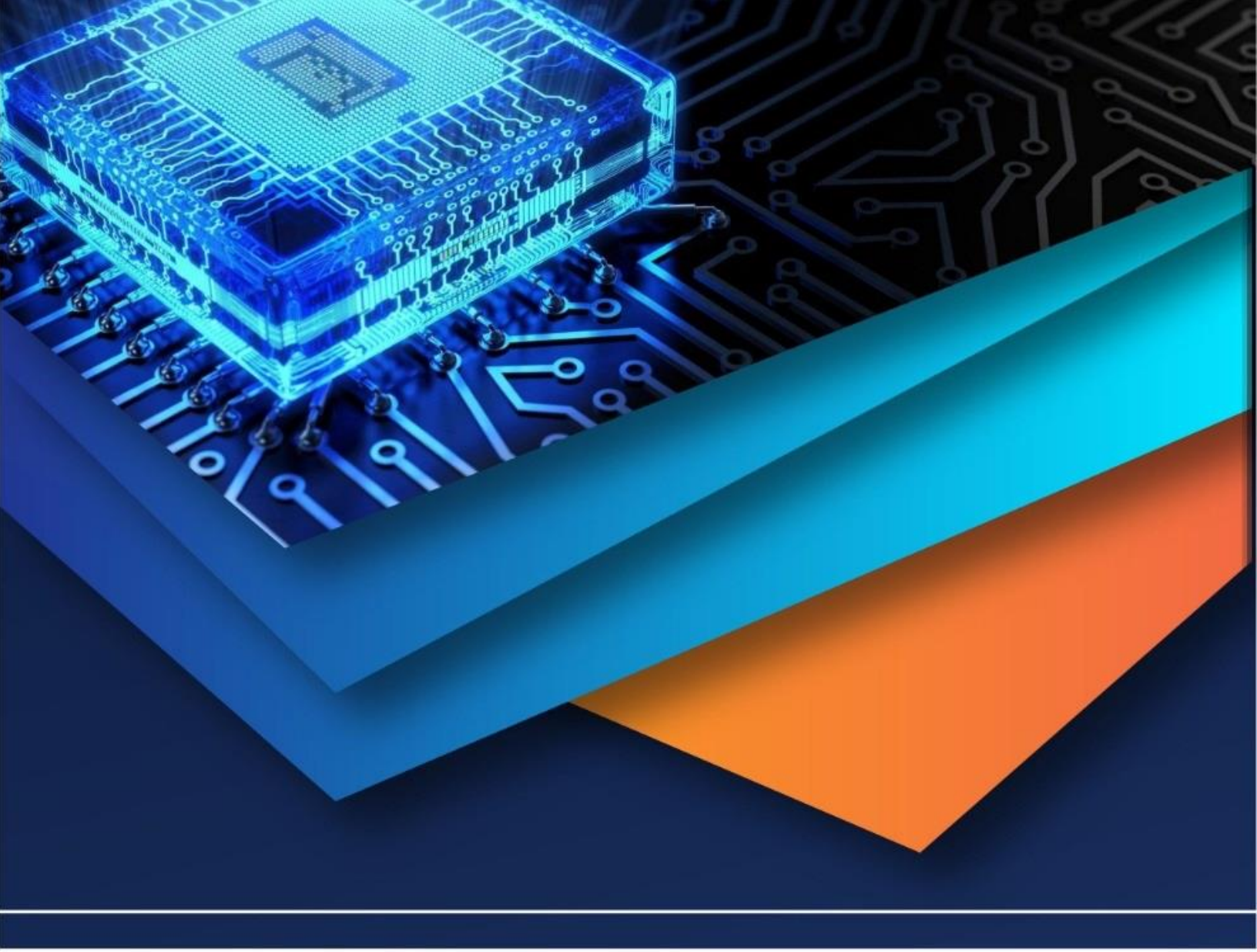
NeuroLearn wants to be more than just a learning tool; it wants to be a friend to every dyslexic learner, helping them build confidence, skills, and empathy.

## VII. ACKNOWLEDGMENT

We are grateful that Vishwakarma Institute of Technology, Pune gave us the resources and infrastructure we required to complete the study. Without their assistance, this project would have been completely impossible to complete. We owe Prof. Madhuri Barhate a great deal for her consistent support throughout this attempt. Also we are very much thankful for the contribution of every individual to helped us in the development of this adaptive personalized learning platform. By their constant support and help, motivated us to continue exploring about or project.

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