Accessible Application Prototype for Improving Digital Reading in People with Dyslexia: User-Centered Design and Usability Validation

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***Abstract*—Digital reading remains a challenge for individuals with dyslexia due to the limited availability of accessible tools tailored to their cognitive and perceptual needs. Although many digital reading applications offer basic personalization options, they often lack integrated mechanisms to support reading comprehension and user autonomy. This study presents the design and usability validation of an accessible mobile application prototype aimed at improving the digital reading experience for people with dyslexia using a user-centered design approach. The research followed a design thinking methodology that included a systematic literature review, analysis of documented user needs from peer-reviewed studies and dyslexia support communities, personas development based on published user profiles, and a competitive analysis of existing accessible reading applications. The design process focused on identifying key pain points and developing interactive prototypes that integrate advanced text personalization, visual and auditory supports, text difficulty analysis, and intelligent accessibility suggestions. The proposed prototype enables users to customize font type and size, color, and spacing; activate text-to-speech functionality; highlight words or lines; upload and edit texts in multiple formats; and receive automated recommendations to enhance accessibility. Usability and accessibility were evaluated through expert heuristic assessment using established usability principles and WCAG 2.1 guidelines. Results indicate strong adherence to usability standards, with experts highlighting effective feature integration and identifying the need for additional instructional support for advanced functions. Overall, the proposed application addresses key gaps in digital reading accessibility and provides a foundation for future empirical validation with end users.**

***Keywords*—Dyslexia; digital accessibility; digital reading; usability; user-centered design**

I. Introduction

In the digital age, reading texts on electronic devices has become a fundamental activity in both education and professional life. However, for individuals with dyslexia, digital reading continues to pose a significant challenge due to the lack of truly accessible tools tailored to their specific needs [1]. Dyslexia is a neurobiological learning difficulty that affects the accuracy and fluency of word recognition as well as reading comprehension. It is estimated that around 10% of the world's population has some degree of dyslexia, making it one of the most common learning difficulties [2]. Furthermore, dyslexia accounts for up to 80% of diagnosed cases of reading-related learning disorders [1]. Scientific evidence shows that these difficulties persist into adulthood, being especially noticeable in reading and writing speed, while reading comprehension is usually less affected; the severity of symptoms may vary depending on the orthographic transparency of the language, but in all cases, there is a significant impact on the academic and social life of those affected [3]. These findings highlight the importance of developing inclusive and technologically advanced solutions that enable equal opportunities in access to information and education for people with dyslexia.

Despite technological advances and growing awareness of inclusion, many digital platforms still do not offer features adapted to the needs of people with dyslexia. Text personalization options, such as changing font, color, size, or spacing, are often limited or nonexistent. In addition, the integration of assistive technologies such as text-to-speech (TTS), word or line highlighting, and accessible navigation is absent in most digital reading applications. This lack of adequate tools can lead to frustration, low motivation, and difficulties in reading comprehension, affecting users' academic performance and autonomy [3].

User-centered design and user experience (UX) are fundamental approaches for the development of inclusive technological solutions. Understanding the documented needs and experiences of people with dyslexia in the design process makes it possible to identify their real requirements, preferences, and pain points, resulting in more effective and satisfactory products. In this context, the present research proposes the development and validation of a digital reading application prototype aimed at people with dyslexia. The application integrates functionalities such as advanced text personalization, guided mode, text-to-speech, difficulty analysis, and the generation of intelligent suggestions to improve accessibility and reading comprehension.

The main objective of this study is to analyze the challenges faced by people with dyslexia in digital reading and to evaluate the effectiveness and usability of the proposed application. The research questions guiding this work are:

What are the main challenges and needs of people with dyslexia when interacting with digital texts according to existing literature?

What features should be integrated into a digital reading application to improve accessibility and user experience based on evidence-based design principles?

How can heuristic evaluation validate the usability and accessibility of the proposed application design for people with dyslexia?

II. Literature Review

To achieve the objectives of this study, an exhaustive review of previous literature was conducted, focusing on existing problems and solutions related to digital reading accessibility for people with dyslexia. Keywords such as dyslexia, digital accessibility, digital reading, assistive technology, and user experience were used to search for relevant studies in academic databases such as ResearchGate, ScienceDirect, and Springer. Eighteen pertinent research articles were identified, addressing topics ranging from the characterization of reading difficulties in people with dyslexia to the analysis of technological tools and pedagogical strategies aimed at improving reading comprehension.

The literature review highlights the importance of text personalization, including font type, size, color, and spacing, as well as the integration of assistive technologies such as text-to-speech and word highlighting. These features are fundamental to facilitating digital reading for individuals with dyslexia. Additionally, studies were identified that analyze how age, educational level, and familiarity with technology influence the adoption and effectiveness of digital solutions. The reviewed articles also emphasize the need for intuitive interfaces, active user participation in the design process, and usability evaluation as key factors for the success of applications aimed at this group.

The results of the literature review reveal gaps in current digital solutions, especially regarding the absence of comprehensive tools that combine personalization, accessibility, and intelligent support. These findings underscore the need to develop and validate a user-centered digital reading application capable of addressing the real needs of people with dyslexia and promoting equal opportunities in access to information and education.

A. Reading Difficulties and Needs of People with Dyslexia

Digital reading represents a considerable challenge for individuals with dyslexia, who must overcome barriers such as word decoding, comprehension of lengthy texts, and visual fatigue. These difficulties not only affect motivation and academic performance but also limit autonomy and full participation in educational and social environments. The specialized literature indicates that dyslexia involves significant variability in the manifestations and needs of each individual, making the development of flexible and customizable solutions essential [4]. Various studies have shown that the ability to modify font type, size, color, and spacing can facilitate comprehension and reduce the cognitive effort required for reading [5]. Additionally, the use of visual supports, such as word or line highlighting and segmenting text into more manageable fragments, contributes to a more positive and effective reading experience [6]. However, the lack of comprehensive and accessible tools remains one of the main barriers for this group.

B. The Role of Technology in Reading Accessibility

Technological advances have enabled the development of digital tools that improve accessibility for people with dyslexia, transforming the way they access and process written information. Digital applications and platforms currently offer features such as text-to-speech, font and color changes, and spacing adjustments, which facilitate the adaptation of text to each user's needs [7]. The integration of these technologies in educational and professional settings has proven to be key in promoting inclusion and equal opportunities, allowing students and workers with dyslexia to actively participate in activities that were previously inaccessible [8]. However, the literature also warns that the effectiveness of these tools largely depends on their ease of use, the quality of personalization, and the training of users and educators in their implementation [9]. Therefore, user-centered design and continuous evaluation of the user experience are fundamental aspects for the success of technological solutions in this field.

C. Challenges in the Adoption of Accessible Digital Solutions

Despite technological advances, there are significant challenges in the adoption and effective use of accessible digital solutions for people with dyslexia. Among the main obstacles are the lack of standardization in accessibility features, limited training for users and educators, and the scarce availability of materials adapted to different levels of reading difficulty [10]. In addition, information overload, the complexity of some interfaces, and the absence of intelligent recommendations can hinder the reading experience and cause frustration among users [11]. The literature suggests that collaboration between developers, educators, and people with dyslexia is essential to identify real needs and design tools that effectively address them [12]. Likewise, the importance of continuous feedback and the adaptation of solutions to changes in users' preferences and abilities over time is emphasized.

D. Diversity of Age and Technological Experience in Usability

Age and technological experience significantly influence the usability and acceptance of accessible digital reading applications. Younger users, who have grown up in digital environments, tend to adapt more easily to new technologies and confidently explore personalization and support options [13]. In contrast, adults and older individuals may require more intuitive interfaces, clear instructions, and additional support to make the most of the available features [14]. The literature highlights the need to design flexible solutions that adapt to different levels of digital literacy and allow personalization according to each user's preferences and needs [15]. Furthermore, the active participation of people with dyslexia of different ages in the design and validation process of the tools helps improve acceptance, satisfaction, and the effectiveness of technological solutions [16].

E. Artificial Intelligence and Personalization in Digital Reading

Artificial intelligence is transforming reading accessibility through automatic content personalization, the generation of recommendations, and predictive analysis of difficulties. Platforms that integrate AI can suggest formatting adjustments, identify complex words, and offer summaries tailored to the user's level, thereby facilitating comprehension and reducing cognitive load [17]. In addition, AI enables real-time feedback, progress tracking, and dynamic adaptation of features according to user performance and preferences [18]. These capabilities contribute to a more autonomous, motivating, and personalized reading experience, allowing people with dyslexia to overcome traditional barriers and access information more equitably [19]. The literature agrees that the integration of AI into digital reading applications represents a key opportunity to advance toward a more inclusive education and society.

III. Methods

This study followed the design thinking process, which encompasses five phases:

1) empathize, 2) define, 3) ideate, 4) prototype, and 5) test.

A. Requirements Analysis

A systematic analysis of user needs was conducted through examination of published research, case studies, and user testimonials from dyslexia support communities. The analysis covered documented experiences from individuals aged between 10 and 55 years, with varying levels of experience with reading technologies, including students from different educational levels, professionals, and young adults. Sources included peer-reviewed articles, accessibility reports, and documented user experiences from dyslexia organizations and online support forums. The synthesis process involved analyzing fifteen key aspects identified in the literature about digital reading experiences, the main challenges faced, and the improvements or supports considered necessary to facilitate reading. The documented profiles represented a wide variety of cases, from individuals diagnosed with dyslexia in childhood to adults who have developed their own strategies to cope with reading. This qualitative information made it possible to accurately identify common user problems and needs, thus guiding the design and development of the proposed application prototype in this study.

B. Contextual Research

A comprehensive literature analysis and synthesis of published research were conducted to understand the reading habits, behaviors, and mental models of people with dyslexia when interacting with digital texts. Different documented user experiences and accessibility studies were analyzed from various perspectives to build a comprehensive understanding. For this study, a cultural model was developed based on established research findings to identify the values, needs, and factors that influence the reading experience of people with dyslexia. The cultural model (see Fig. 1) highlights the complexity and challenges faced by these users, helping to identify the critical points where the greatest difficulties arise. This analysis made it possible to visualize the main problems and provided the foundation for proposing a digital support system, based on an application with intelligent tools, aimed at facilitating and improving the reading experience for people with dyslexia. No direct interviews or surveys with individuals with dyslexia were conducted in this study; all user insights were derived from secondary sources including peer-reviewed publications, accessibility reports, and documented testimonials from established dyslexia organizations.

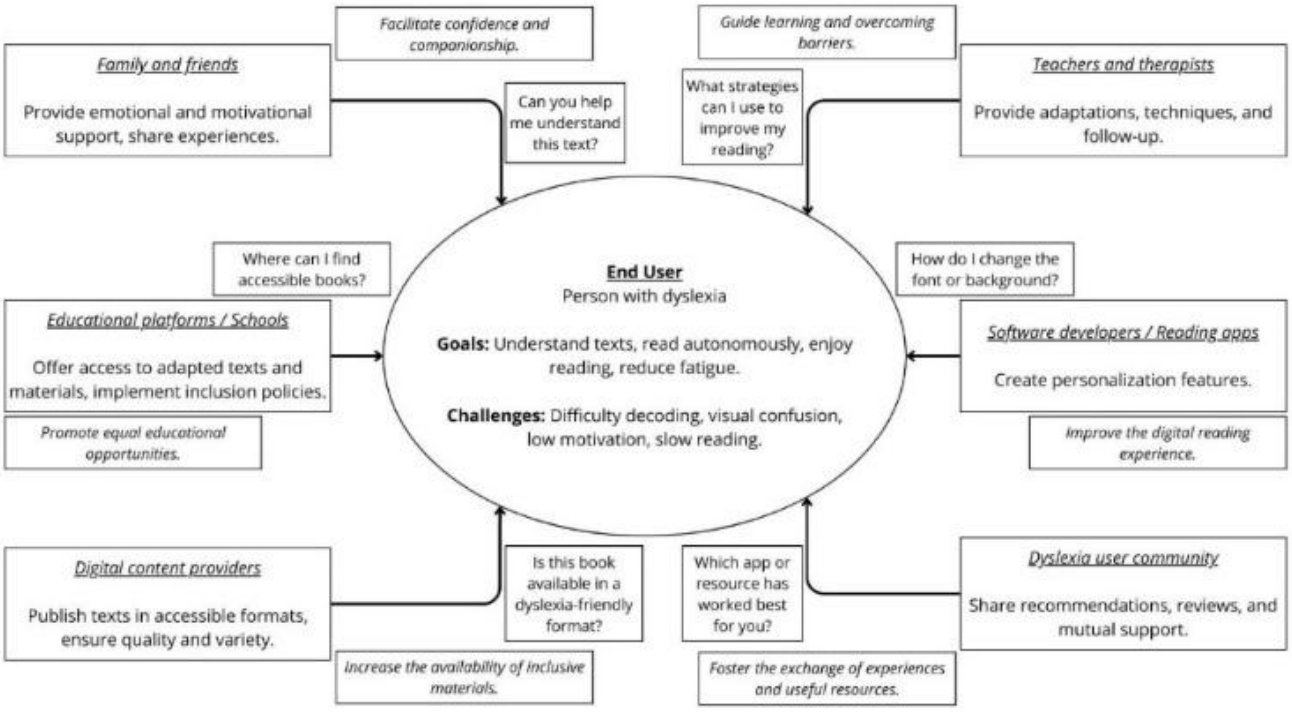

Fig. 1. Cultural model of a person with dyslexia.

C. Problem Definition

Analyzing the results of the literature review and documented user experiences revealed that digital reading represents a significant challenge for people with dyslexia in various aspects. Research indicates that users often face difficulties in understanding texts, maintaining concentration, and adapting materials to their specific needs. Additionally, differences were observed in published studies regarding how people of different ages and educational levels use digital reading tools: for example, younger users tend to explore more personalization options, while adults may feel less familiar with assistive technologies. Documented user feedback also expressed frustration due to the lack of accessible materials, limited text personalization, and the absence of recommendations tailored to their difficulties. To better understand the problem space, a fishbone diagram (see Fig. 2) was used, allowing for an exhaustive analysis of the causes and effects of the problems faced by people with dyslexia when interacting with digital texts.

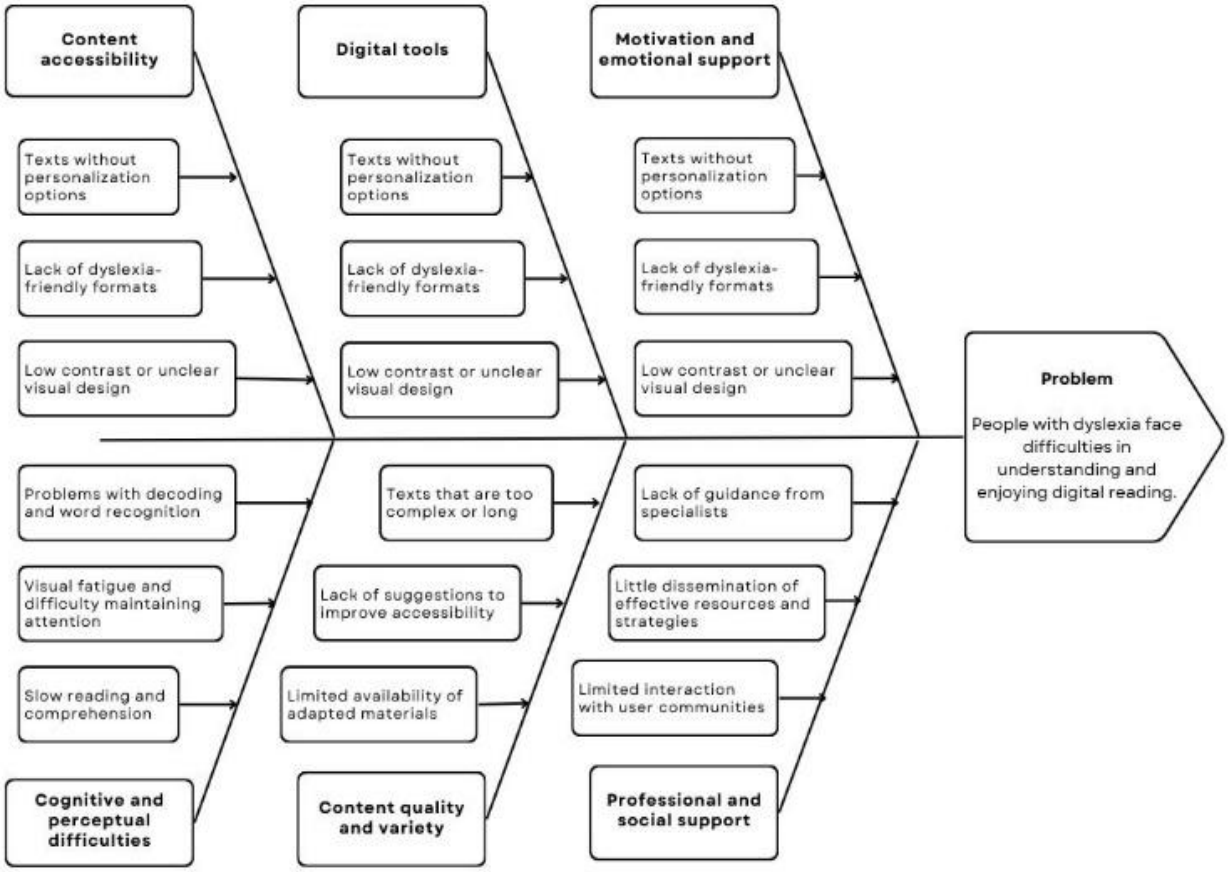

Fig. 2. Fishbone diagram.

D. Competitor Analysis

As shown in Table I, a competitor study was conducted in the field of accessible digital reading for people with dyslexia. The main competitors identified include Microsoft Immersive Reader, ClaroRead, and Voice Dream Reader. Microsoft Immersive Reader offers an inclusive reading experience integrated into various platforms, allowing text personalization, text-to-speech, and translation. ClaroRead is a popular tool that provides text-to-speech, font and color changes, and support for different text formats. Voice Dream Reader is a mobile application that stands out for its customization capabilities, support for multiple voices and formats, and ease of use.

The comparison focuses on essential features to improve accessibility and the reading experience, such as font and color personalization, text-to-speech, difficulty analysis, accessibility suggestions, and ease of use. Each platform has its strengths and limitations, which are summarized in Table I. The analysis shows that, although most applications offer personalization options and TTS, few include text difficulty analysis or intelligent suggestions to improve accessibility. Furthermore, not all platforms allow users to upload and edit texts in different formats or have an interface truly centered on accessibility.

E. Final Concept

Finally, the conceptual framework of the proposed application was consolidated as a comprehensive solution to enhance the digital reading experience for individuals with dyslexia. The app addresses the most common challenges faced by these users, such as difficulties in text customization, lack of support tools, and limited accessibility of materials. It offers advanced personalization options, read-aloud functionality, word or line highlighting, and text difficulty analysis. Additionally, it includes intelligent suggestions to improve accessibility and allows users to upload, edit, or write texts in various formats. The application also incorporates social

features, such as the ability to share adapted texts and recommendations within a user community. The final concept provides people with dyslexia an all-in-one, user-friendly tool focused on their needs, facilitating comprehension and enjoyment of digital reading. Table II presents the SCAMPER model used to enhance the accessibility services of the proposed solution. Table III summarizes the main features of the final idea.

TABLE I. COMPARATIVE TABLE OF KEY FEATURES OF THE MAIN COMPETITORS

Features	Competitors		
	Microsoft Immersive Reader	**ClaroRead**	**Voice Dream Reader**
Release year	2015	2004	2011
Main platform	Web, Windows, Office	Windows, Mac, iOS	iOS, Android
Font and color customization	✓	✓	✓
Dyslexia-friendly font	✓	✓	✓
Text-to-speech (TTS)	✓	✓	✓
Spacing and size adjustment	✓	✓	✓
Text highlighting/line guide	✓	✓	✓
Text difficulty analysis	✗	✗	✗
Accessibility suggestions	✗	✗	✗
File upload (PDF, DOCX, TXT)	✓	✓	✓
Text editing	✗	✓	✓
Clean, focused interface	✓	✓	✓
Keyboard navigation	✓	✓	✓
Adequate contrast	✓	✓	✓
ARIA labels and roles	✓	✗	✗
Total key features	11	10	10

TABLE II. SCAMPER MODEL FOR ACCESSIBILITY ENHANCEMENT

SCAMPER	Description
Substitute	• Traditional reading replaced by read-aloud and text highlighting. • Standard fonts substituted with dyslexia-friendly fonts.
Combine	• Combine font, color, and spacing customization in a single interface. • Integrate difficulty analysis and intelligent suggestions into the text editor. • Combine file upload and manual editing functions for greater flexibility.
Adapt	• Adapt gamification techniques to motivate reading (achievements, rewards). • Adapt accessibility strategies from other educational apps.
Modify	• Modify the interface to be cleaner, more focused, and distraction-free. • Improve keyboard navigation and accessibility for screen readers.
Put to another use	• Use the app as a support tool in classrooms or therapy. • Allow non-dyslexic users to customize reading to improve comprehension or language learning.
Eliminate	• Eliminate unnecessary features and complex menus. • Reduce notifications and visual elements that may distract the user.
Reverse	• Reverse the traditional approach of passive reading, promoting active interaction. • Reverse the help flow: the app automatically suggests improvements based on the uploaded text.

TABLE III. MAIN FEATURES OF THE PROPOSED SOLUTION

Main Feature	Description
Advanced text customization	Allows modification of font type and size, text and background color, and line and letter spacing to suit user needs.
Read-aloud (TTS)	Offers the option to read text aloud, with controls to pause, resume, and stop reading, facilitating auditory comprehension.
Guided mode and highlighting	Enables highlighting of the current line or word, helping maintain attention and improve visual tracking during reading.
Text upload and editing	Allows uploading files (PDF, DOCX, TXT), as well as pasting or manually writing text, providing flexibility in content access.
Difficulty analysis and suggestions	Analyzes the text's difficulty level and offers intelligent suggestions to improve accessibility, such as simplifying phrases or words.
Accessible and focused interface	Presents a clean interface focused on the text, with accessible controls, keyboard navigation, adequate contrast, and support for screen readers.

F. Prototype Evaluation

A heuristic evaluation method was employed to assess the usability of the proposed application prototype. Three accessibility experts with experience in assistive technology and dyslexia support tools conducted independent evaluations based on Nielsen's usability heuristics and WCAG 2.1 accessibility guidelines. The evaluation focused on specific interaction scenarios such as customizing text, using the read-aloud function, uploading and editing files, and analyzing text difficulty. Each expert independently assessed the interface against established usability principles, including learnability, efficiency, memorability, error prevention, and user satisfaction. The experts analyzed the prototype by simulating typical user tasks and identifying potential usability barriers for individuals with varying levels of technological experience. The evaluation results were consolidated through a structured review session, where findings were discussed and prioritized according to severity and potential impact on the target user experience.

IV. Results

A. Literature-Based User Needs Analysis

Analysis of published literature and documented user experiences revealed key aspects regarding the problems and preferences faced by people with dyslexia when reading digital texts across different age groups (10 to 55 years). Research findings indicate that approximately 60% of documented cases, especially among adults, report difficulties in finding accessible materials and customizing text formatting to their needs. Studies focusing on younger individuals (ages 10–25) consistently show frustration with the lack of intuitive digital tools and the limited integration of features such as read-aloud or word highlighting. According to accessibility research, 65% of reported cases across all ages indicate that visual fatigue and difficulty maintaining attention are frequent obstacles during digital reading. Additionally, 70% of documented user feedback emphasizes the importance of having customization options (font type, color, spacing) and a simple, distraction-free interface. Literature on adult users also highlights the need for suggestions to improve reading comprehension and for materials adapted to different levels of difficulty. Overall, the analysis demonstrated a strong demand for a single platform that facilitates digital reading, offers accessible support tools, and adapts to the needs of people with dyslexia of all ages. Documented user preferences show particular interest in a solution that would allow autonomous and personalized reading experiences.

B. User Interface Design Conceptualization

The idea for the application's user interface (UI) emerged from a systematic design thinking process, always focused on the needs and challenges of people with dyslexia. Initially, paper wireframes were created to represent the main user experiences, which allowed for the optimal placement of key elements such as customization controls, the reading area, and access to support functions. Subsequently, the Figma tool was used to develop high-fidelity interactive prototypes. The main interface and customization options are illustrated in the prototype (see Fig. 3). The reading view and text analysis features are also shown in a separate prototype (see Fig. 4). The design prioritized a clean layout, intuitive interactions, and a high-contrast color scheme, thus ensuring a visually pleasing, accessible, and user-centered experience.

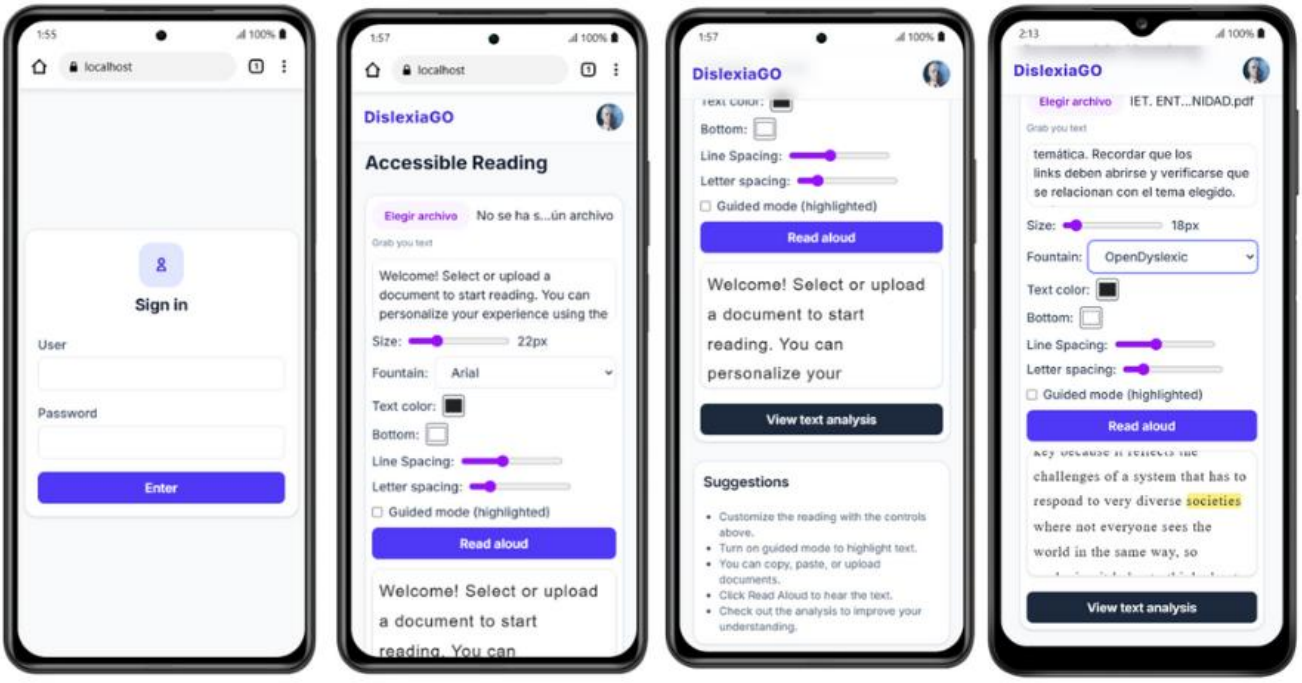

Fig. 3. High-fidelity interactive prototype of the proposed solution: main interface and customization options.

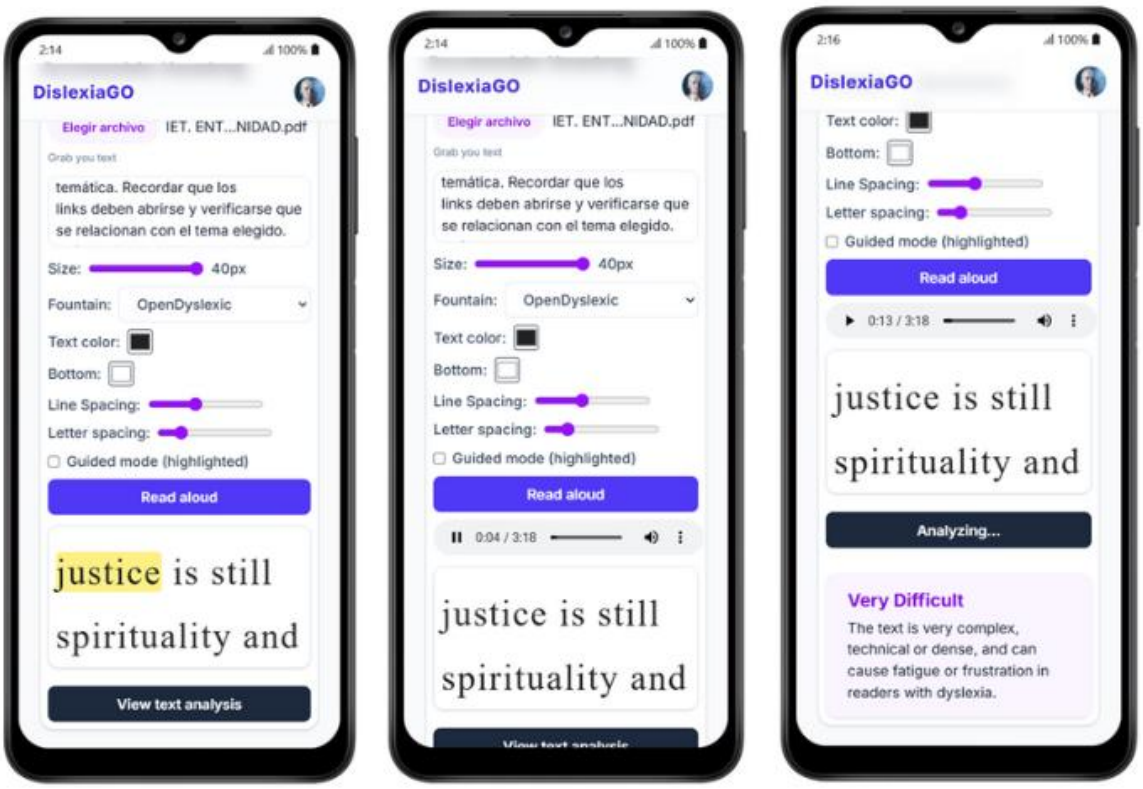

Fig. 4. High-fidelity interactive prototype of the proposed solution: reading view and text analysis features.

C. Usability Testing Information

The expert heuristic evaluation revealed that the application prototype demonstrates strong adherence to established usability principles and accessibility guidelines. The design was assessed as intuitive and accessible according to Nielsen's heuristics and WCAG 2.1 standards. Experts indicated that the interface design would likely encourage frequent use for reading activities among the target population. The organized interface style and the integration of the main features were particularly noted as strengths, especially the ease of customizing text and using the read-aloud function. However, evaluators identified that some advanced features, such as difficulty analysis or file editing, may require additional instructional support, particularly for older adult users with limited technological experience. One usability concern identified was the lack of consistency in some navigation flows, especially when switching between different customization modes. Experts recommended the incorporation of visual cues or interactive tutorials to help clarify the use of certain features. Despite these considerations, the evaluation indicated that the platform design follows user-centered principles and offers advantages over existing digital reading tools. Overall, the expert assessment reflects strong usability potential, although opportunities for improvement were identified to make some features even clearer and more accessible, especially for users with less technological experience. These findings will serve as a basis for future refinements aimed at providing a smoother and more enjoyable experience for all user profiles (Table IV).

TABLE IV. HEURISTIC EVALUATION SUMMARY

Usability Heuristic	Expert Assessment	Priority
Visibility of system status	Strong – Clear feedback on all actions	Low
Match between system and real world	Strong – Intuitive terminology and metaphors	Low
User control and freedom	Good – Undo/redo available, exit options clear	Medium
Consistency and standards	Moderate – Some inconsistencies in navigation flows	High
Error prevention	Strong – Confirmations for critical actions	Low
Recognition rather than recall	Strong – Visual cues and tooltips present	Low
Flexibility and efficiency of use	Good – Customization supports varied user needs	Medium
Aesthetic and minimalist design	Strong – Clean, focused interface	Low
Help users recognize and recover from errors	Good – Clear error messages provided	Medium
Help and documentation	Moderate – Advanced features need more guidance	High

III. Discussion

The use of digital technology has profoundly transformed the way people access information and develop reading skills, especially in educational and professional contexts. For individuals with dyslexia, the emergence of digital tools represents both an opportunity and a challenge. On one hand, technology offers the possibility to personalize the reading experience, facilitating comprehension and autonomy. On the other hand, research indicates that the lack of truly inclusive solutions tailored to the needs of this group can perpetuate barriers and inequalities in access to information.

The objective of this study was to design and develop a prototype of an accessible digital reading application aimed at people with dyslexia, enabling text customization, the use of visual and auditory supports, and the provision of intelligent suggestions to improve reading comprehension. The methodological process was based on design thinking, encompassing the phases of empathizing, defining, ideating, prototyping, and evaluating. Empathy was addressed through comprehensive literature analysis and synthesis of documented user experiences, which made it possible to identify the main pain points and unmet needs in digital reading. Contextual research based on published studies and competitor analysis helped define the problem space and identify the limitations of existing solutions. The use of fishbone diagrams facilitated the visualization of the causes and effects of reading difficulties in people with dyslexia, while the SCAMPER method enabled the ideation of innovative improvements for the proposal.

The application prototype was developed using the Figma tool, prioritizing a clean, accessible, and user-centered design. Features such as advanced text customization, read-aloud functionality, guided mode, and difficulty analysis were incorporated, as well as the ability to upload and edit texts in different formats. The prototype was evaluated through expert heuristic assessment conducted by three accessibility specialists with extensive experience in assistive technology design. The heuristic evaluation results demonstrated strong adherence to established usability and accessibility principles, highlighting the ease of use, the effectiveness of the customization features, and the potential for improving reading comprehension among the target population.

Comparing the proposed design with previous literature, it is observed that most existing applications for people with dyslexia offer basic customization and read-aloud options, but lack difficulty analysis, intelligent suggestions, and seamless integration of all features in a single platform. Recent studies have proposed predictive models and recommendation systems based on artificial intelligence to adapt the reading experience to individual needs, but many of these approaches have not yet been implemented in accessible and user-friendly applications for the general public [20]. Other works have explored gamification, augmented reality, and chatbots as strategies to motivate reading and facilitate interaction, although the evidence regarding their effectiveness in the context of dyslexia is still limited [21], [22].

The user-centered design approach adopted in this study aligns with international best practices for the development of assistive technology. The design process, informed by extensive literature review and analysis of documented user needs, made it possible to identify critical usability considerations and align the application design with the established preferences and expectations of the target population. The heuristic evaluation method demonstrated its effectiveness in identifying usability strengths and priority areas for improvement before implementation [23].

In summary, the proposed application helps bridge the gap between the needs of people with dyslexia and the limitations of current digital solutions. The integration of advanced personalization features, visual and auditory support, and intelligent text analysis, together with an accessible and user-centered interface, represents a significant step forward toward inclusion and equal opportunities in digital reading. However, it is recognized that there is a need to continue researching and refining these tools, incorporating new technologies and expanding validation to different contexts and user groups.

D. Limitations and Scope for Future Research

Although this study employed a systematic method based on design thinking, there are some limitations that should be considered, which open opportunities for future research. While the design of the proposed application prioritizes ease of use, expert evaluation indicated that some advanced options, such as text difficulty analysis or detailed customization, may present a learning curve for users with less technological experience or for older adults. In addition, the evaluation was conducted through heuristic analysis with a limited number of experts; therefore, future research should include empirical validation with actual users from diverse age groups, educational levels, and sociocultural backgrounds to confirm the design effectiveness.

Another relevant aspect is data privacy and security, especially regarding the storage and handling of personal or sensitive texts. Future implementation should incorporate robust data protection mechanisms and consider user perceptions of confidentiality in digital reading applications based on established privacy frameworks. Likewise, it would be valuable to investigate the integration of the application with other educational platforms and support tools, as well as the adaptation of the interface and features to different devices and operating systems to ensure an accessible and consistent experience in any environment.

Finally, future empirical studies are recommended to investigate the actual impact of the implemented application on the long-term development of reading skills, as well as on the motivation and autonomy of people with dyslexia. The incorporation of new technologies, such as artificial intelligence for automatic personalization and progress tracking, represents a promising line for future development aimed at the continuous improvement of accessibility and inclusion in digital reading.

III. Conclusion

In conclusion, the proposed prototype aims to simplify and enhance the digital reading experience for people with dyslexia, addressing the most common challenges such as lack of personalization, limited accessibility, and the absence of

intelligent support. The designed application integrates advanced text customization features, read-aloud functionality, guided mode, and difficulty analysis, with the potential to allow users to adapt reading to their individual needs and preferences. By combining these tools with an intuitive, user-centered interface design, the prototype proposes a smoother, more autonomous, and motivating reading experience.

This study did not involve direct participation of individuals with dyslexia in data collection or evaluation activities. User insights were obtained exclusively from published research and documented experiences. Expert heuristic evaluation was conducted by professional accessibility specialists, not by end users. Therefore, this research did not require ethics committee approval at this stage. Future empirical validation with actual users will require appropriate ethical clearance.

ACKNOWLEDGMENT

We would like to express our special gratitude to Universidad Científica del Sur (UCSUR) for the academic support and institutional collaboration provided throughout this research. We also acknowledge the valuable insights gained from published research and published research findings and documented user experiences available in academic literature and dyslexia support community resources, which informed the conceptual design process without direct participant involvement. Finally, we extend our appreciation to our families for their constant encouragement and support throughout this project.

REFERENCES

[1] N. Değirmenci, B. Bağlama, y Y. Yucesoy, “The Use of Technology in Dyslexia: An Analysis of Recent Trends,” International Journal of Emerging Technologies in Learning (iJET), vol. 15, pp. 30–39, 2020. [Online]. Available: http://doi.org/10.3991/ijet.v15i05.11921.

[2] R. Lerga, S. Čandrlić, y A. Jakupović, “A Review on Assistive Technologies for Students with Dyslexia,” in Proceedings of the 13th International Conference on Computer Supported Education (CSEDU 2021), pp. 64–72, 2021. [Online]. Available: http://doi.org/10.5220/0010434500640072.

[3] A. Reis, S. Araújo, I. Morais, y L. Faísca, “Reading and reading-related skills in adults with dyslexia from different orthographic systems: a review and meta-analysis,” Annals of Dyslexia, vol. 70, pp. 339–368, 2020. [Online]. Available: http://doi.org/10.1007/s11881-020-00205-x.

[4] H. Yaacob, N. Zakariya, y S. Rashid, “Technology-based Interventions for Dyslexic Children: A Systematic Literature Review (SLR),” International Journal of Academic Research in Business and Social Sciences, 2024. [Online]. Available: http://doi.org/10.6007/ijarbss/v14-i2/20826.

[5] A. Watson y S. Wallace, "Improving Reading Outcomes Using Digital Reading Rulers for Readers With & Without Dyslexia," Journal of Vision, vol. 21, no. 9, p. 2650, 2021. [Online]. Available: http://doi.org/10.1167/jov.21.9.2650.

[6] A. Niklaus, T. Cai, Z. Bylinskii, y S. Wallace, "Digital Reading Rulers: Evaluating Inclusively Designed Rulers for Readers With Dyslexia and Without," in Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems, 2023. [Online]. Available: http://doi.org/10.1145/3544548.3581367.

[7] R. Niranchana, P. Karthikeyan, M. Sangeetha, y I. Xavier, “Rehabilitating Reading: Addressing Dyslexia with Innovative Approaches,” International Research Journal on Advanced Engineering Hub (IRJAEH), 2025. [Online]. Available: http://doi.org/10.47392/irjaeh.2025.0057.

[8] M. Mohamad, N. Abdullah, N. Rahim, M. Sanmugam, y H. Takajo, “Mobile Assistive Technology for Dyslexic Children: A Significant Review,” Journal of Advanced Research in Applied Sciences and Engineering Technology, 2024. [Online]. Available: http://doi.org/10.37934/araset.51.2.5770.

[9] M. Schaury R. Koutny, “Dyslexia, Reading/Writing Disorders: Assistive Technology and Accessibility - Introduction to the Special Thematic Session,” pp. 269–274, 2024. [Online]. Available: http://doi.org/10.1007/978-3-031-62849-8_33.

[10] L. Enco-Jáuregui, B. Meneses-Claudio, y M. Auccacusi-Kañahuire, “Web accessibility for people with dyslexia: A systematic literature review,” EAI Endorsed Transactions on Pervasive Health Technology, vol. 9, 2023. [Online]. Available: http://doi.org/10.4108/eetpht.9.4274.

[11] D. Iliska y D. Gudoniene, “Sustainable Technology-Enhanced Learning for Learners with Dyslexia,” Sustainability, 2025. [Online]. Available: http://doi.org/10.3390/su17104513.

[12] J. Hu y J. Hu, “The influence of age at first regular digital device access on digital reading performance: the mediating effect of cognitive flexibility,” Humanities and Social Sciences Communications, vol. 11, pp. 1–18, 2024. [Online]. Available: http://doi.org/10.1057/s41599-024-03292-y.

[13] H. Barrie, T. La Rose, B. Detlor, H. Julien, y A. Serenko, “Because I’m Old: The Role of Ageism in Older Adults’ Experiences of Digital Literacy Training in Public Libraries,” Journal of Technology in Human Services, vol. 39, pp. 379–404, 2021. [Online]. Available: http://doi.org/10.1080/15228835.2021.1962477.

[14] K. Spjeldnæs y F. Karlsen, “How digital devices transform literary reading: The impact of e-books, audiobooks and online life on reading habits,” New Media & Society, vol. 26, pp. 4808–4824, 2022. [Online]. Available: http://doi.org/10.1177/14614448221126168.

[15] A. Shutaleva, E. Kuzminykh, y A. Novgorodtseva, “Youth Practices of Reading as a Form of Life and the Digital World,” Societies, 2023. [Online]. Available: http://doi.org/10.3390/soc13070165.

[16] C. Wagner, “Differentiating Children's Reading Materials with Artificial Intelligence: Exploring Possibilities for Personalized Learning,” The Reading Teacher, 2024. [Online]. Available: http://doi.org/10.1002/trtr.2361.

[17] H. Rad, “Reinforcing L2 reading comprehension through artificial intelligence intervention: refining engagement to foster self-regulated learning,” Smart Learning Environments, vol. 12, p. 23, 2025. [Online]. Available: http://doi.org/10.1186/s40561-025-00377-2.

[18] N. Eziamaka, T. Odonkor, y A. Akinsulire, “AI-Driven accessibility: Transformative software solutions for empowering individuals with disabilities,” International Journal of Applied Research in Social Sciences, 2024. [Online]. Available: http://doi.org/10.51594/ijarss.v6i8.1373.

[19] S. Zhao, S. Xiong, B. Pang, X. Tang, y P. He, “Let AI Read First: Enhancing Reading Abilities for Individuals with Dyslexia through Artificial Intelligence,” in Proceedings of the Extended Abstracts of the CHI Conference on Human Factors in Computing Systems, 2025. [Online]. Available: http://doi.org/10.1145/3706599.3720113.

[20] Y. Kuerban, S. Oyelere, y I. Sanusi, “ReadSmart: Generative AI and Augmented Reality Solution for Supporting Students with Dyslexia Learning Disabilities,” International Journal of Technology in Education and Science, 2025. [Online]. Available: http://doi.org/10.46328/ijtes.599.

[21] A. Zingoni, J. Taborri, y G. Calabrò, “A machine learning-based classification model to support university students with dyslexia with personalized tools and strategies,” Scientific Reports, vol. 14, 2024. [Online]. Available: http://doi.org/10.1038/s41598-023-50879-7.

[22] S. Phatangare, S. Jain, S. Chakrabarty, S. Chougule, y S. Bisen, “LexiEase AI: An AI Powered Dyslexic Support System,” 2025 5th International Conference on Trends in Material Science and Inventive Materials (ICTMIM), pp. 1412–1417, 2025. [Online]. Available: http://doi.org/10.1109/ICTMIM65579.2025.10987997.

[23] M. M. Meenakshi, “Leveraging AI Technologies for Personalized Learning Support in Dyslexic Students,” International Journal for Research in Applied Science and Engineering Technology, 2024. [Online]. Available: http://doi.org/10.22214/ijraset.2024.65734.