

The Reality Of Adopting Informatics Programs In Diagnosing Writteen Language Disorders : Dyslexia As A Model

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Abstract:

This study aims to explore the reality of using information programs in diagnosing written language disorders, with dyslexia as a case study. To achieve this objective, we adopted a descriptive methodology. The sample consisted of 27 practicing speech-language pathologists from 12 provinces in Algeria. we distributed a questionnaire containing 12 questions divided into three sections : the first section collected personal information about each specialist, while the second and third sections addressed the tools they use to diagnose dyslexia and the possibility of employing information programs for this purpose .

The results revealed several challenges and difficulties related to the diagnosis of dyslexia, including the scarcity of appropriate diagnostic tools and the complete absence of programs that assist in performing this process accurately and efficiently.

Keywords: diagnostic ; diagnostic informatics programs; dyslexia

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Introduction:

The world is witnessing continuous and significant digital and informational developments that compel all scientific disciplines to adapt by integrating technology into their systems. This shift is essential for elevating these fields, and orthophony, like other scientific specialties, is required to adopt modern approaches, tools, and methods in place of traditional practices previously used for the diagnosis and management of various disorders. One such disorder is dyslexia, characterized as an impairment in processing written language and manifesting as difficulty in decoding and accurately reading words, despite the absence of deficits in intelligence or sensory abilities (Abdelsalam, 2020). Given the widespread prevalence of dyslexia in school environments, scholars and researchers have diligently developed diagnostic instruments and tools to identify this disorder and the cognitive and linguistic challenges faced by dyslexic children. Diagnosis is "a systematic process during which the nature of the problem or disorder is identified, through gathering and analyzing data using standardized tests," and constitutes a fundamental step in constructing an effective treatment program (Sassi, 2018, pp. 115-130).

In 2015, Professor Zeddami Hada conducted a study involving a sample of 510 students aged 8 to 12, aiming to develop a standardized test to assess reading ability in Arabic. The study's findings demonstrated the effectiveness of the test in diagnosing deficits related to reading mechanisms, thus enabling precise identification of the type of dyslexia (Zeddami, 2015). Another study, published in the Journal of the Faculty of Education at Al-Azhar University in 2016, designed a dyslexia diagnostic tool comprising seven subtests and adapted partial tests from ODEDYS for the Algerian context. The results revealed a validated instrument with strong psychometric properties and high efficiency in identifying children with dyslexia.

Both studies primarily aimed to develop tests for diagnosing dyslexia, underscoring the critical role of accurate diagnosis in the effectiveness and smoothness of intervention processes. These efforts have produced tools that allow for determining the level and type of reading disability. Nevertheless, it is essential to incorporate technology into the diagnostic process. The use of advanced assessment software enables more precise testing and big data analysis to identify patterns and behaviors associated with dyslexia, resulting in faster case detection.

Despite various international initiatives that have produced electronic programs dedicated to diagnosing dyslexia such as the Dyslexia Screening Test (DST), ODEDYS, LOGATOMES, and others the clinical context in Algeria still suffers from a scarcity of these tools, due to lack of Arabic localization and limited specialized training among orthophonists. Moreover, local studies rarely acknowledge the existence of officially adopted or documented diagnostic software in Algerian clinics. Therefore, this study seeks to address that gap, interpret its causes, and explore the current landscape, especially considering the ongoing digital transformation in global health systems (Barkoukis & Tzivinikou, 2020, pp. 1345–1360).

Problem Statement:

With rapid technological advancements, it has become necessary to pose precise scientific questions about the extent to which technology is being utilized in therapeutic and psychological specialties, particularly orthophony, especially regarding the diagnosis of dyslexia. Despite growing awareness of the efficacy of digital programs in improving diagnostic quality, Algerian practice does not show widespread adoption of such technologies. The studies dealing with this topic remain limited, raising a central research problem formulated as follows:

What is the actual state of utilizing digital programs in diagnosing dyslexia among Algerian children within clinical settings?

This question emerges from field observations that reveal a gap between the potential offered by technology and its practical application in orthophonic diagnosis. Investigating this gap calls for scientific inquiry to identify the factors influencing this limited use where it exists.

Study Questions:

Based on the general problem concerning the use of digital programs in diagnosing dyslexia among Algerian children in clinical environments, and in alignment with field results, the study poses the following questions:

What are the current methods and tools employed by specialists to diagnose dyslexia in Algerian clinical practice?

To what extent are digital programs dedicated to dyslexia diagnosis available and used in Algerian clinical environments?

What are the needs and perspectives of orthophonists regarding the employment of digital programs in diagnosing dyslexia, and how well do these programs fit the Algerian context?

To address these questions, several hypotheses emerge reflecting the reality of digital program adoption in dyslexia diagnosis. The central hypothesis is: "Digital programs are used only partially and to a limited extent for diagnosing dyslexia in Algerian children."

Study Objectives

This study aims to:

Identify the current state of using digital programs in diagnosing dyslexia within the Algerian clinical setting.

Determine the types of diagnostic software used if any and their prevalence among speech-language pathologists (orthophonists).

Identify the obstacles and challenges limiting the adoption of technology in orthophonic diagnosis.

Provide practical recommendations to promote the use of modern digital tools within orthophonic clinics.

Contribute to raising awareness among professionals regarding the importance of integrating technology in dyslexia diagnosis and enhancing the effectiveness of therapeutic intervention.

Significance of the Study

The significance of this study stems from its focus on a tangible gap in the field of orthophony in Algeria, represented by the notably limited use of modern digital programs for diagnosing dyslexia, despite their proven effectiveness in numerous international contexts. From this perspective, the study represents an initial attempt to assess the field reality of digital tool usage in the Algerian environment, while directing the attention of specialists and practitioners toward the necessity of keeping pace with digital transformation in diagnosis. Furthermore, it contributes to enriching the scientific literature on technology in orthophony and encourages the integration of modern digital tools to improve care for children with dyslexia.

Operational Definition of Concepts

Dyslexia: In this study, dyslexia refers to specific difficulties a child faces in reading and understanding words, despite possessing intact cognitive and sensory abilities. It is identified based on indicators of low performance on standardized reading assessments.

Diagnostic Software (Logiciels de diagnostic): Refers to digital tools or computer programs specifically designed to assess linguistic and cognitive indicators associated with

dyslexia through interactive tests that analyze a child's performance and assist in identifying the type and level of reading impairment.

Algerian Clinical Setting: In this context, refers to the totality of institutions, orthophonic centers, and psychological clinics where orthophonic diagnosis is practiced in Algeria, whether public or private.

Literature Review

Zeddam, H. (2018). Diagnosis of dyslexia in the Algerian school. Al- Lisaniyyat, 24(1).

This study sought to identify patterns of dyslexia among Algerian primary school students in grades three through five, within the age range of 8 to 12 years. The study relied on Coltheart's (2001) theoretical model concerning dual cognitive routes for word reading (phonological/sublexical and surface/lexical routes), identifying different levels of dyslexia (phonological, surface, and mixed). Results indicated clear cases of each type and proposed precise guidelines for orthophonists to develop diagnostic methods based on this model (Zeddam, 2018).

Benhaddadi, D., & Belhaouchet, K. (2024). Methodological approach to the diagnosis of dyslexia in Algerian schools. International Journal of Education, Sciences & Engineering, 16.

This study targeted the Algerian educational context by implementing a sequential diagnostic approach on a sample of 100 third-grade students from two schools. It employed a battery of standardized tests with strict inclusion and exclusion criteria to identify children presenting profiles indicative of dyslexia. The study concluded that adopting a systematic, staged diagnostic process helps specialists improve detection accuracy and guide early interventions, while providing a clear organizational framework for the diagnostic process in school settings (Benhaddadi & Belhaouchet, 2024).

Mehali, J. (2018). Dyslexia and its relationship to academic achievement among primary school students. Journal of the Researcher in Human and Social Sciences, 10(3).

The study aimed to explore the relationship between dyslexia and academic achievement levels among students in Tizi Ouzou province. Using a descriptive approach that included measuring oral and silent reading, as well as a self-report scale for learning difficulties, it found a statistically significant positive correlation between the level of dyslexia and academic achievement, and showed significant differences favoring females. The study recommended field training for teachers and educational psychologists in recognizing and effectively addressing signs of dyslexia (Mehali, 2018).

Field Research Procedures

Research Methodology

This study adopted a descriptive-analytical approach, as it is appropriate for the nature of the subject, which seeks to examine the reality of using digital programs in diagnosing dyslexia among Algerian children within clinical settings, and to analyze the opinions and practices of specialists in this field. This methodology allows for the collection of both quantitative and qualitative data that helps describe the phenomenon under study, analyze its dimensions, and determine the extent of the prevalence and effectiveness of these software programs as perceived by practitioners in the clinical field.

Study Boundaries

This research was conducted over a time period extending from November 2022 to March 2023, across 11 provinces of Algeria: Mila, Constantine, Setif, Batna, Jijel, Algiers, Blida, Tipaza, Ain Defla, Mostaganem, and Laghouat.

Research Instruments

An electronic questionnaire was used in this research, targeting practicing speech-language pathologists (orthophonists) in the Algerian context. The questionnaire was developed by the researchers after extensive literature review and consultations with several professors in the field and practicing orthophonists to examine the diagnostic situation in the Algerian clinical field. It was then converted to an electronic version via Google Forms due to the limited number of orthophonists who responded positively in the province where the work initially began, and to collect the maximum amount of information necessary to complete the research.

The questionnaire was distributed electronically via email and the Facebook social media platform to practicing orthophonists using purposive sampling, while participation was voluntary. It was also distributed in paper form to some practitioners present in the provinces of Mila and Constantine. The questionnaire is divided into three sections:

Section One: Contains personal information about the orthophonists, including 5 questions aimed at describing the research sample and understanding its characteristics.

The questions are:

What is your specialty?

Educational level: Bachelor's – Master's – PhD

What is your workplace institution?

Which province do you work in?

How many years of professional experience do you have?

Section Two: Includes 4 questions concerning dyslexia diagnosis, the methods and tools adopted by specialists in the Algerian field, and their opinions on the most important aspects that should be assessed to diagnose dyslexia. The questions are:

Have you encountered cases of dyslexia in your professional career?

If yes, can you mention the methods and tools you relied on to diagnose these cases?

Based on your professional practice, what assessment scales and tests are available in the Algerian field and used to diagnose dyslexia?

What aspects are essential to evaluate in a child with dyslexia?

Section Three: Contains 4 questions, some related to the reality of computer technology use in the Algerian clinical field, and others designed to examine the need for digital programs to diagnose dyslexia. The questions are:

Based on your professional experience, are there digital programs for diagnosing dyslexia? If yes, please name them.

Do you think they are adapted to the Algerian context?

As an orthophonist, do you need a digital program to diagnose dyslexia?

Based on your professional experience as an orthophony specialist, what are the advantages that digital programs designed for diagnosis might offer?

2.1 Research Sample

At this point, we present the research sample according to a set of factors.

Table (1): Characteristics of the Research Sample

Characteristic	Category	Frequen cy	Percenta ge
Educational Qualification	Bachelor's Degree	4	14.8%
	Master's Degree	13	48.1%
	PhD	10	37%
Professional Experience	1-5 years	20	74%
	5-10 years	5	18.6%
	More than 10 years	2	7.4%
Specialization	Language and Communication Disorders	11	40.7%
	Clinical Neurolinguistics	6	22.2%
	General Orthophony	10	37%
Workplace	Private Orthophonic Clinic	8	29.62%
	Kindergarten	2	7.40%
	Educational Association	3	11.11%
	Educational Academy	2	7.40%
	Screening and Follow-up Unit	4	14.81%
	Psychological-Pedagogical Center for Intellectual Disabilities	4	14.81%
	Sétif University	1	3.7%
	Fraunce Fanon Hospital Center, Blida	1	3.7%
	Psychological and Orthophonic Rehabilitation Center	1	3.7%
	Private Clinic (ENT Specialization)	1	3.7%
Province	Mila	8	29.62%
	Sétif	1	3.7%
	Algiers	2	7.4%
	Constantine	2	7.4%
	Batna	3	11.11%
	Laghouat	1	3.7%
	Mostaganem	1	3.7%
	Ain Defla	1	3.7%
	Blida	4	14.81%
	Tipaza	3	11.11%
	Jijel	1	3.7%

The table reveals the characteristics of the research sample, which included 27 practicing orthophonists distributed across 11 provinces of Algeria. The overwhelming majority held a Master's degree, numbering 13 specialists, representing 48.1%, while 10 specialists held a PhD, accounting for 37%, and only 4 held a Bachelor's degree, representing 14.8%.

The specializations of sample members were distributed diversely between Language and Communication Disorders at 40.7% and General Orthophony at 37%, followed by Clinical Neurolinguistics with the lowest proportion at 22.2%.

Regarding the types of institutions where specialists work, there were 10 different institutions. The highest proportion was private orthophonic clinics at 29.62%, with the remaining percentages distributed as shown in the table.

When examining professional experience, it was found that the majority of practitioners (20) had between 1-5 years of experience, representing 74%, followed by 5 practitioners with 5-10 years of experience at 18.6%, while only 2 practitioners had more than 10 years of experience, accounting for 7.4%.

1. Presentation, Analysis, and Discussion of Research Results

At this point, we present the results of the exploratory research conducted in the Algerian clinical field, which revolves around the main research question: What is the reality of using digital programs in diagnosing dyslexia among Algerian children? In our work, we will adhere to the methodological sequence of the questions comprising the questionnaire.

First Question: Have you encountered cases of dyslexia in your professional career?

The specialists' responses to this question are summarized in Table (2) below.

Table (2): Percentage Distribution of Exposure to Dyslexia Cases

Response	Number of Specialists	Percentage
Yes	21	77.8%
No	6	22.2%

A significant majority of sample specialists have dealt with dyslexia cases, with 77.8% answering "yes" to the question "Have you encountered cases of dyslexia in your professional career?"

Second Question: What methods and tools did you use to diagnose these cases?

Some specialists rely on specifically designed tests such as Professor Zeddami's dyslexia diagnosis test and Professor Ghellab's Al-Otla test, in addition to the Al-Nuzha test. Others have relied on diagnosis from a psychiatrist, along with other indicators such as the child's grade repetition in second grade twice and their reading performance, combined with complementary examinations and interviews with the classroom teacher.

Third Question: According to your professional practice, what scales and tests are available in the Algerian field that are used to diagnose dyslexia?

Specialists mentioned several measures available in the Algerian context and used for diagnosing dyslexia, varying between individual tests and test batteries: the Al-Otla test, the Al-Khumasi battery, Professor Zeddami's dyslexia test, the Al-Noubi test, the oral comprehension test, the Al-Ziyat battery, and Shlabi Abdel-Hafiz's test.

Fourth Question: What aspects are essential to evaluate in a child with dyslexia?

Specialists mentioned numerous aspects, each according to their specialization and professional experience, as follows:

Cognitive abilities—Executive functions—Complementary medical examinations
Attention and concentration—Fluency—Auditory and visual discrimination
Working memory—Selective attention—Encoding—Perception—Intelligence
Information processing—Storage and retrieval strategies
Phoneme-to-grapheme conversion—Phonological awareness
Phonological tests—Comprehension—Semantics

Fifth Question: According to your professional experience, are there digital programs for diagnosing dyslexia? If yes, please name them.

The specialists' responses to this question are summarized in Table (3) below.

Table (3): Percentage Distribution of Availability of Digital Diagnostic Programs According to Sample Members

Response	Number of Specialists	Percentage
No digital programs exist	23	85.2%
Digital programs exist	4	14.8%

The majority of specialists answered "no" to the question about the existence of digital programs for diagnosing dyslexia, with a rate of 85.2%. They did not mention any program except for "Visual scanning and inhibition exercises available on Google," which does not constitute a diagnostic software program.

Sixth Question: Do you think they are adapted to the Algerian context?

The specialists' responses to this question are summarized in Table (4) below.

Table (4): Percentage Distribution of Digital Programs Adapted to the Algerian Context According to Sample Members

Response	Number of Specialists	Percentage
Yes	3	11.1%
No	24	88.9%

88.9% of specialists believe that even if digital programs for diagnosing dyslexia exist, they are not adapted to suit the Algerian context.

Seventh Question: As an orthophonist, do you need a digital program to diagnose dyslexia?

The specialists' responses to this question are summarized in Table (5) below.

Table (5): Percentage Distribution of the Need for Adapted Digital Programs According to Sample Members

Response	Number of Specialists	Percentage
Yes	25	92.6%
No	2	7.4%

Twenty-five specialists expressed their need for such digital programs designed for diagnosis, representing 92.6%, while the remaining specialists do not consider themselves in need of such tools.

Eighth Question: According to your professional experience as an orthophony specialist, what advantages might digital programs designed for diagnosis offer?

Specialists unanimously agree that digital programs designed for diagnosis represent a qualitative step that keeps pace with technological advancement, offering numerous advantages. They contribute to reducing the time and effort expended in traditional diagnostic processes and allow for obtaining accurate and reliable results in a short timeframe. Additionally, they are easy to access and apply without complications, thanks to the widespread availability of modern electronic tools. These tools represent an ideal means to enhance diagnostic quality and make the process more interactive and effective.

Table (6) below summarizes the questionnaire questions directed to orthophonists and their responses.

Question #	Question	Response Type	Response
01	Have you encountered cases of dyslexia in your professional career?	Yes/No	21 out of 27 specialists answered "yes"
02	What methods and tools did you rely on to diagnose these cases?	Open-ended	Some specialists rely on specifically designed tests such as Professor Zeddami's dyslexia diagnosis test and Professor Ghellab's Al-Otla test, in addition to the Al-Nuzha test. Others have relied on diagnosis from a psychiatrist and other indicators such as the child's grade retention in second grade twice and their reading performance, along with complementary examinations and interviews with the classroom teacher.
03	According to your professional practice, what scales and tests are available in the Algerian field used to diagnose dyslexia?	Open-ended	Specialists mentioned several measures available in the Algerian context and used for dyslexia diagnosis, varying between individual tests and test batteries: the Al-Otla test, the Al-Khumasi battery, Professor Zeddami's dyslexia test, the Al-Noubi test, the oral comprehension test, the Al-Ziyat battery, and Shlabi Abdel-Hafiz's test.
04	What aspects are essential to evaluate in a child with dyslexia?	Open-ended	Cognitive abilities—Executive functions—Complementary medical examinations—Attention and concentration—Fluency—Working memory—Selective attention—Encoding—Perception—Intelligence—Information processing—Storage and retrieval strategies—Auditory and visual discrimination—Phoneme-to-grapheme conversion—Phonological awareness—Phonological tests—Comprehension—Semantics.
05	According to your professional experience, are there digital programs for diagnosing dyslexia? If yes, please name them.	Yes/No with details	23 specialists answered "no" and did not mention any program except for "Visual scanning and inhibition exercises available on Google," which does not constitute a diagnostic software program.
06	Do you think they are adapted to the Algerian context?	Yes/No	24 specialists believe that even if digital programs for diagnosing dyslexia exist, they are not adapted to suit the Algerian context.
07	As an orthophonist, do you need a digital program to diagnose dyslexia?	Yes/No	25 specialists expressed their need for such digital programs designed for diagnosis, while the remainder do not consider themselves in need of such tools.
08	According to your professional experience as an orthophony specialist, what advantages might digital programs designed for diagnosis offer?	Open-ended	They will keep pace with technological advancement. They will save time and effort and allow for obtaining results. They can be accessed and applied with ease. These diagnostic software programs will be more engaging than paper-based tests.

Analysis and Discussion of Results

The results presented in the table reveal that the prevalence rate of dyslexia has become noteworthy, with 77.8% of specialists who completed the questionnaire confirming their experience treating individuals with dyslexia. The prevalence rate has been estimated between 2% to 10% of primary school children worldwide (Billard et al., 1995, p. 146). In another

study, Al-Ziyat (1998) reported that the rate of dyslexia, dysgraphia, and spelling difficulties reached 20.6% in the Arab world (El-Sayed, 2005, p. 129), and increased in Canada between 2001 and 2006 from 11.8% to 15.6% (AQTA, 2007).

The results also indicate that orthophonists in Algeria rely on two specifically designed tests for diagnosing dyslexia: Professor Ghellab Saliha's "Al-Otla" test, which focuses on reading speed and error count, and Professor Zeddami Hada's test, which diagnoses and determines the type of dyslexia (phonological, surface, or deep) in children aged 8-12 years. Additionally, they use comprehensive test batteries for learning disabilities or measures that assess a single aspect of the disorder. However, most specialists base their diagnosis on factors such as the child's grade retention in second grade and complementary examinations, along with interviews with the classroom teacher. This underscores that the Algerian context is in urgent need of more dyslexia diagnostic tools that are readily available and accessible to all specialists. They have expressed a desire for a comprehensive diagnostic tool that assesses, to the extent possible, the cognitive and mental abilities involved in the reading process, as deficiencies in any of these can lead to dyslexia.

The results affirmed the specialists' need for digital programs to diagnose dyslexia. Their responses did not provide the name of any diagnostic tool based on technology, neither at the national level nor internationally. This marked lack of technological tools and digital programs compels us to recognize the necessity of utilizing these resources to assist children with dyslexia by incorporating them into various stages of intervention, particularly diagnosis, which serves as the foundation for designing therapeutic plans. The responses clarified the benefits such a tool would provide in terms of facilitating the diagnostic process and achieving faster and more accurate results than traditional methods (paper-and-pencil tests). Using a computer, for example, increases children's motivation and reveals specific skills such as problem-solving abilities (Anderman et al., 1994, p. 308), and such tools would significantly enhance the work of the practicing orthophonist. Thus, the study's hypothesis is confirmed: the use of digital programs to diagnose dyslexia is highly limited or nonexistent according to the research data in the Algerian field.

Discussion and Interpretation of Results

To what extent do psychologists use digital programs in diagnosing dyslexia among Algerian children within clinical settings?

The study results indicate that psychologists' use of digital programs for diagnosing dyslexia remains at moderate to weak levels. This reflects that digital technology, despite its relative availability, has not yet become an integral part of dyslexia diagnostic practice. The data revealed that many specialists lack sufficient training in how to utilize specialized software in assessing learning disorders, either due to the absence of university training in this field or the lack of technical resources and technological support provided by clinical institutions. Furthermore, some specialists expressed concern about losing the humanistic clinical aspect of diagnosis when relying excessively on computerized tools. This demonstrates that there is a gap between available technical capabilities and actual professional practices within Algerian clinics.

These findings align with the conclusions of Ahmed Ben Zeina's study (2020), which clarified that specialists suffer from a lack of specialized training in dealing with modern technologies in psychological diagnosis, particularly in Algerian work environments. Additionally, Larson & Miller's study (2018) emphasized that theoretical knowledge alone is insufficient for effective use of digital tools without continuous training.

What types of digital programs are used by psychologists in diagnosing dyslexia?

Research results demonstrated that the quality of programs used is generally limited to traditional or translated tools, often being general-purpose applications not specialized in reading disorders (such as Excel files or simple psychological assessment programs). Few practitioners mentioned the use of specialized diagnostic tools such as the Dyslexia Screener or L2P programs, which assess dyslexia indicators in a standardized manner. However, their availability is limited and often linked to research centers or personal efforts. This reveals the absence of a clear policy within health institutions to adopt or localize modern diagnostic software, with heavy reliance on subjective clinical judgment without systematic digital support.

This is consistent with what Abdullah Gharbi (2019) pointed out, emphasizing that the infrastructure of Algerian clinics still lacks informational equipment, and the integration of digital means in psychological work remains theoretical rather than practical. Additionally, Hall & Smith's study (2016) stressed the necessity of a supportive technological environment for the successful implementation of such programs.

What are the challenges and difficulties that hinder the use of digital programs in diagnosis?

The results pointed to key obstacles: weak training in the digital field, absence of technical equipment within clinics, and the inadequacy of certain software for the Algerian linguistic and cultural context. Most programs are designed in foreign languages, particularly French and English, and do not account for the linguistic specificities of Arabic or Amazigh languages. Additionally, some specialists lack confidence in the results of computerized programs and prefer classical methods based on interviews and direct observation. This highlights the importance of integrating specialized academic and professional training in this field to overcome these obstacles, as advocated by Benaïssa's study (2019), which stressed the need to adapt technological tools to suit the Algerian clinical context.

These obstacles align with the findings of Fatiha Barkani's study (2021), which identified several organizational, cultural, and training barriers preventing the digitalization of psychological practices. Additionally, Gillespie et al.'s study (2017) clarified that digital transformation requires institutional commitment and long-term investment, which many clinics in developing countries lack.

Conclusion

Through the presentation, analysis, and discussion of results obtained via an electronic questionnaire directed at practicing orthophonists concerning the reality of adopting digital programs to diagnose dyslexia, this study's results—despite the limited sample of 27 orthophonists from various provinces—reveal a clear picture of professional practice in Algeria, particularly regarding dyslexia diagnosis. The study uncovered significant challenges faced by specialists in this field, primarily stemming from a marked shortage of diagnostic tools. Digital tools based on modern techniques and technology remain unavailable at the national level, complicating the orthophonist's tasks and making the diagnostic process more difficult and complex, while also affecting the accuracy and reliability of results.

In this context, it has become necessary to enrich the bank of diagnostic tests designed to align with the social and cultural characteristics of the Algerian environment while benefiting from the accelerated technological advancement in this field. Furthermore, establishing connections between university academic research and professional practice represents a fundamental step toward promoting the professional performance of orthophonists and developing locally-based digital diagnostic software with precision and effectiveness. At the conclusion of this study, we can present a series of recommendations and suggestions, which we summarize as follows:

Recommendations:

The necessity of designing digital diagnostic programs that take into account Algerian cultural and linguistic specificities, with emphasis on achieving diagnostic accuracy.

Combining traditional methods (paper-and-pencil tests) and modern digital techniques during the development and enhancement of digital diagnostic programs.

The necessity of developing partnerships and collaboration among various educational, health, and technological institutions to support the use of digital programs and ensure their sustainability.

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