Teachers' perspectives on the effectiveness of the rapid automatized naming program for students with dyslexia in Saudi Arabia

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Abstract: Dyslexia is a prevalent neurodevelopmental disorder that affects approximately one in five children, significantly impairing reading fluency, spelling, word recognition, and overall academic performance. Despite extensive research on the neurological basis of dyslexia, effective intervention strategies remain a critical challenge. This study examines teachers' perspectives on the effectiveness of the Rapid Automatized Naming (RAN) program as an intervention for students with dyslexia in Saudi Arabia. Utilizing a descriptive-analytical approach, the research explores the perceived impact of the RAN program on word recognition, reading fluency, and academic performance. A purposive sample of 150 teachers (75 male, 75 female) participated in the study. Data were collected through a structured questionnaire, validated by experts in special education, and tested for reliability using Cronbach's alpha. Statistical analyses, including ANOVA and measures of central tendency, were conducted to assess the effectiveness of the RAN program, teaching strategies, and implementation challenges. The findings indicate that teachers perceive the RAN program as highly effective in improving reading skills and cognitive processing among students with dyslexia. However, moderate challenges in implementation were identified, including inadequate teacher training, limited resources, and difficulties in accommodating individual learning differences. The study underscores the necessity of targeted professional development to enhance teachers' ability to implement the RAN program effectively. By addressing these challenges, the educational system can optimize intervention strategies for students with dyslexia. This research contributes to evidence-based practices in special education, advocating for inclusive and effective instructional approaches. Future studies should explore additional factors influencing the success of the RAN program and investigate strategies to enhance its implementation.

Keywords: Dyslexia, Rapid automatized naming (RAN) program, Reading intervention, Special education, Saudi Arabia, Teacher perspectives.

1. Introduction

Dyslexia is a specific learning disability of neurological origin that primarily affects word decoding, spelling, reading fluency, and accuracy [1]. It is estimated to impact approximately one of five children and is classified as a reading-related learning disability. Individuals with dyslexia often experience persistent difficulties in spelling and reading words accurately and fluently [2].

As a language-processing disorder, dyslexia arises from cognitive impairments that differentiate it from other reading-related learning disabilities [3]. It encompasses a range of challenges, including deficits in accurate word recognition, impaired handwriting, reading comprehension difficulties, and struggles with mathematical reasoning [4]. These difficulties are primarily attributed to a deficiency in

the phonological component of language, which affects the ability to associate sounds with corresponding letters [1]. Importantly, these challenges often appear inconsistent with an individual's overall cognitive abilities and persist despite appropriate instructional interventions.

Moreover, dyslexia can lead to secondary consequences, such as deficits in reading comprehension and reduced exposure to reading experiences, which may hinder vocabulary development and the acquisition of background knowledge [1]. The persistent nature of dyslexia underscores the importance of early identification and targeted interventions to mitigate its impact on academic achievement and literacy development.

Dyslexia is a common neurodevelopmental disorder that affects approximately one in five children, significantly impairing reading fluency, spelling, word recognition, and overall academic performance [1]. Despite extensive research establishing the neurological basis of dyslexia, there remains a gap in effective intervention strategies that address its diverse challenges, including deficits in reading comprehension, poor handwriting, and difficulties in mathematical reasoning [2].

Traditional educational approaches often fail to meet the specific learning needs of students with dyslexia, contributing to persistent academic underachievement, diminished self-esteem, and restricted career opportunities [3]. The absence of early identification and targeted instructional interventions further exacerbates these difficulties, highlighting the need for more effective strategies that enhance phonological processing, reading comprehension, and overall literacy development.

The present study examines teachers' perspectives on the effectiveness of the RAN program as an intervention for students with dyslexia in Saudi Arabia. By evaluating its impact on word recognition, reading fluency, and academic performance, this research seeks to contribute to developing evidence-based practices that support inclusive and effective educational frameworks in special education.

1.1. Research Questions

RQ1. What is the effectiveness of the rapid automatic naming program for individuals with dyslexia from the perspective of their teachers?

RQ2. What is the effectiveness of the teaching strategies used in the automatic naming program for individuals with dyslexia from their teachers' perspective?

RQ3. What are the challenges faced by learning difficulties teachers in implementing the automatic naming program for dyslexics?

2. The Role of (RAN) in Reading Fluency and Comprehension

RAN is a cognitive task that assesses the speed at which individuals can name familiar symbols, such as letters, digits, and colors [5]. It is widely recognized as a key predictor of reading fluency and comprehension, particularly among students with dyslexia [6]. Research indicates that individuals with dyslexia often exhibit deficits in phonological processing, working memory, and visual-verbal integration—cognitive processes essential for reading proficiency [7-9]. The "double deficit" hypothesis posits that impaired phonological awareness and slow RAN are primary contributors to reading difficulties in students with dyslexia, underscoring the importance of interventions targeting RAN to improve reading automaticity [10].

Empirical studies have demonstrated that RAN performance accounts for significant variance in reading fluency and comprehension, beyond what can be explained by phonological awareness alone. For instance, research conducted on Chinese school-aged children with dyslexia found that RAN accounted for 13.3% of the variance in reading fluency among intermediate readers, whereas phonological awareness contributed 6.5% among beginning readers [11]. Similarly, a meta-analysis by Chen, et al. [5] reported a moderate correlation between RAN and spelling ($r \approx 0.44$), as well as reading, with stronger effects observed in languages characterized by opaque orthographies.

In the context of Arabic, which is classified as a deep orthographic system with complex morphological structures, slower RAN speeds pose significant challenges for students with dyslexia. The difficulty in rapid symbol retrieval impedes the development of essential sound-to-print

connections, thereby hindering decoding and overall reading proficiency [12]. These findings highlight the critical role of RAN in reading development and emphasize the need for targeted interventions that enhance processing speed and automaticity in struggling readers.

While RAN training alone may not directly enhance reading skills, its integration into structured literacy programs—emphasizing phonemic awareness, phonics, and fluency drills—has been associated with measurable improvements [13]. For example, Wolfsperger and Mayer [14] conducted a study evaluating a software-based RAN training program among 57 children (mean age: 9.3 years). Following an 18-day intervention, participants demonstrated increased letter and number naming speeds, which contributed to improvements in word-reading performance. However, the study found no significant effects on pseudoword reading or full-text comprehension, suggesting that the benefits of RAN training may be limited to specific reading components.

Similarly, Ibrahim and Nemt-allah [15] investigated the effects of a 10-week RAN intervention on fifth-grade students with learning disabilities. Their findings indicated significant improvements in reading accuracy, rate, prosody, and comprehension, with gains maintained at a six-week follow-up assessment. These results support the notion that while RAN training enhances reading fluency, its effectiveness is maximized when combined with other literacy interventions.

3. The Effectiveness of the RAN Program in Saudi Arabia

In Saudi Arabia, the implementation of RAN-based interventions encounters systemic challenges stemming from cultural, linguistic, and structural barriers [16]. Although awareness of dyslexia as a neurocognitive disorder is increasing, misconceptions persist among educators and parents, with reading difficulties often attributed to a lack of effort or intelligence rather than underlying cognitive deficits. These misconceptions can contribute to delays in diagnosis and intervention [17, 18].

For instance, Alshammari [19] found that primary school teachers in Saudi Arabia frequently associate reading struggles with student motivation rather than phonological processing deficits, underscoring the need for enhanced awareness of dyslexia's cognitive basis. Addressing these challenges requires targeted professional development programs and policy reforms that promote evidence-based literacy interventions, including RAN-based strategies, to support students with dyslexia more effectively.

The linguistic characteristics of Arabic present unique challenges for the implementation of RAN-based interventions [20, 21]. Arabic's diglossic nature, characterized by significant differences between Modern Standard Arabic (MSA) and spoken dialects, complicates symbol-fluency tasks and phonological processing [22]. Furthermore, many existing RAN tools are direct translations of English-based materials and do not account for critical linguistic features of Arabic, such as emphatic consonants (/ض/ ,/ص/), which are essential for reading automaticity and fluency [23]. These limitations highlight the need for culturally and linguistically adapted RAN assessments and interventions that better address the phonological and orthographic complexities of Arabic.

Structural inequities further impede the widespread adoption of RAN-based interventions in Saudi Arabia. Rural schools, which constitute approximately 40% of the country's educational institutions, often face significant funding shortages, limiting access to specialized dyslexia training programs [24]. Without systemic reforms to address these disparities, the effectiveness and accessibility of RAN interventions will remain constrained [25].

4. Teachers' Perceptions of the Effectiveness of the RAN Program

Teachers' perspectives on the effectiveness of the RAN program are influenced by various demographic and professional factors, including educational attainment, teaching experience, and academic specialization. Research indicates that educators with higher levels of education, particularly those holding postgraduate qualifications in special education or psychology, are more likely to

recognize the cognitive underpinnings of dyslexia and the significance of interventions such as RAN Peltier, et al. [26].

Downey, et al. [27] found that teachers with advanced degrees are more inclined to implement evidence-based instructional practices, including RAN-based interventions, to support students with dyslexia. Additionally, educators who receive specialized training in reading disabilities demonstrate a more comprehensive understanding of phonological processing skills and are more likely to perceive RAN as an effective tool for enhancing reading fluency and comprehension [28]. These findings underscore the importance of targeted professional development programs that equip teachers with the necessary expertise to implement RAN interventions effectively.

In Saudi Arabia, postgraduate programs such as King Saud University's Master of Special Education incorporate coursework on dyslexia screening tools and intervention frameworks, including RAN [29]. Graduates of these programs often favor structured literacy approaches that integrate RAN, recognizing its role in enhancing decoding fluency [30]. However, disparities in accessibility between urban and rural areas have led to variations in teacher preparedness, with urban centers such as Riyadh and Jeddah demonstrating higher fidelity in RAN implementation [31].

Teaching experience also plays a critical role in shaping educators' receptiveness to interventions such as RAN. In Saudi Arabia, teachers with over ten years of experience may exhibit skepticism toward RAN, often influenced by past encounters with Western-designed programs that did not fully accommodate the linguistic complexities of Arabic [30]. Over time, experienced educators develop a repertoire of strategies to support diverse learners and often hold well-established perspectives on the efficacy of various interventions [32]. In contrast, teachers with formal training in special education are more likely to endorse structured reading interventions such as RAN, as their direct experience with dyslexic students informs their understanding of the program's potential benefits [33].

Teachers with limited exposure to dyslexia interventions may be less convinced of the effectiveness of RAN, while those with experience working with special education students are more likely to recognize its benefits in enhancing rapid word retrieval [34]. Additionally, teachers' specialty majors significantly influence their perceptions of the RAN program. Educators with backgrounds in special education are more inclined to acknowledge the importance of phonological processing skills and are generally more supportive of using RAN to assist students with dyslexia [35]. In contrast, general education teachers or subject-area specialists may lack awareness of dyslexia-specific interventions, which can result in limited confidence regarding the effectiveness of the program [36].

Teachers specializing in early childhood education often emphasize foundational literacy skills, such as phonemic awareness and letter-sound recognition, which align with the goals of RAN [37]. In contrast, educators in middle or high school settings may prioritize content comprehension over fluency, which can result in lower adoption rates of RAN-based interventions.

Several studies highlight the positive outcomes associated with RAN-based interventions. For example, Ibrahim and Nemt-allah [15] found that 78% of teachers observed measurable improvements in reading fluency, accuracy, and prosody among students with learning disabilities after a 10-week RAN training program. Similarly, a study conducted in Saudi Arabia reported that 65% of teachers noted enhanced reading speed and comprehension among students with dyslexia following the implementation of RAN [38].

However, the effectiveness of the RAN program varies based on factors such as teacher training, intervention fidelity, and contextual elements like language complexity and access to specialized resources. Overcoming these challenges will require using culturally adapted materials, integrating structured literacy approaches, and ongoing professional development.

5. Methodology

This study employed a descriptive-analytical approach, which extends beyond mere data collection and classification to provide an in-depth and accurate representation of the phenomenon under investigation. This methodological framework allowed the researchers to examine teachers' perspectives

on the effectiveness of the (RAN) program for students with dyslexia in Saudi Arabia. Specifically, the study aimed to identify the challenges teachers encounter in implementing the RAN program and explore the teaching strategies they employ in its application for students with dyslexia.

The study sample consisted of 150 teachers, equally distributed between 75 male and 75 female participants. A purposive sampling technique was employed to ensure the selection of participants who met specific criteria relevant to the study. This approach was chosen based on the nature of the study population, ensuring that participants had direct experience with the RAN program, as well as the required level of accuracy needed for meaningful analysis and reliable conclusions. Additionally, the selection process considered the homogeneity of participants concerning the key characteristics under investigation. By applying this sampling strategy, the study aimed to enhance the validity and reliability of its findings while ensuring that the selected teachers provided insights directly relevant to the research objectives.

6. Research Measurement

To collect data for this study, the researchers developed a questionnaire based on a comprehensive review of theoretical literature and previous studies that examined the perspectives of learning disabilities teachers on the effectiveness of the RAN program for students with dyslexia in Saudi Arabia. The questionnaire was designed to explore teachers' perceptions of the program's effectiveness, the teaching strategies used, and the challenges encountered in its implementation. It consisted of three main sections: the effectiveness of the RAN program for students with dyslexia, as perceived by teachers of learning difficulties (10 items); the effectiveness of teaching strategies used in the RAN program, as perceived by teachers (5 items); and the challenges associated with implementing the RAN program, as perceived by teachers (6 sections).

A five-point Likert scale was employed to measure the degree of effectiveness and the challenges faced by special education teachers. The response options ranged from strongly agree (5) to strongly disagree (1) and were quantitatively converted into numerical values (5, 4, 3, 2, 1) for statistical analysis. To establish validity, the questionnaire was reviewed by eight experts in the field of special education. These experts assessed the instrument for accuracy, clarity, suitability for the target group, and relevance to the research topic. Their feedback led to the refinement of several items, with some being reworded for clarity and others removed to enhance the overall coherence of the questionnaire.

The instrument's reliability was assessed through a pilot study involving 100 teachers of learning difficulties drawn from the study population. Internal consistency was measured using Cronbach's alpha (split-half) formula and analyzed using SPSS software. The results of this reliability analysis are presented in the following section.

Table 1.
Reliability of the Questionnaire

Survey axes	f	Cronbach's alpha
The effectiveness degree of the RAN program for dyslexic students from the perspective of their teachers.	10	0.904
The effectiveness of teaching strategies used in the automatic naming program for individuals with dyslexia from the perspective of their teachers.	5	0.806
Challenges faced by learning difficulties teachers in implementing the automatic naming program for dyslexics from the perspective of their teachers.	6	0.877
	21	0.888

As shown in table (1), the calculated reliability coefficients for the axes of RAN program effectiveness questionnaire for students with dyslexia, as assessed from the perspective of their teachers, as well as for the overall questionnaire, are within acceptable ranges. The Cronbach's alpha values ranged between 0.904 and 0.806, indicating high internal consistency. These high-reliability values suggest that the questionnaire is a reliable tool for measuring the intended constructs and can be used

with confidence to achieve the objectives of this study. In analyzing the study data, the researcher employed several statistical methods, including Cronbach's alpha equation to calculate the reliability of the questionnaire, multiple variance analysis (ANOVA) to examine the differences between groups, and averages and standard deviations to assess the central tendency and variability of the data. These methods ensured a comprehensive analysis of the data, providing robust results and validating the study's conclusions

6.1. Results

The data analysis in this study was conducted in alignment with the research objectives, which aimed to explore teachers' perspectives on the effectiveness of (RAN) program for students with dyslexia in Saudi Arabia. Specifically, the study examined teachers' perceptions of the program's effectiveness, the challenges encountered in its implementation, the teaching strategies employed within the program, and differences in teachers' perspectives based on gender.

To address the first research question, which investigated the perceived effectiveness of the RAN program for students with dyslexia, the researchers employed means and standard deviations to analyze teachers' responses. This statistical approach allowed for a clearer understanding of the variations in teachers' perspectives regarding the program's effectiveness. The results of this analysis are presented in the following section.

Table 2.
Effectiveness of the RAN Program for Students with Dyslexia.

	SD	M	SD	Level
1	The RAN labeling program leads to quick access to information and its acquisition in a shorter time.	4.35	1.267	High
2	The fast automatic labeling program utilizes speed reading when necessary.	4.32	1.227	High
3	The fast automatic labeling program leads to speed and greater focus in reading.	4.29	1.272	High
4	The fast automatic naming program enhances understanding and comprehension by focusing on words without dwelling on every letter and word.	4.27	1.220	High
5	The RAN program leads to improved student attitudes towards reading and greater confidence in reading.	4.27	1.227	High
6	The RAN program improves students' awareness of the functions of their eyes and minds and their effective use when reading or studying.	3.98	1.787	High
7	The RAN program enhances students' ability to quickly retrieve verbal (auditory) information from long-term memory.	3.12	0.882	Average
8	The RAN program addresses the double deficit associated with reading difficulties (phonological awareness and RAN program together).	3.09	0.784	Average
9	The fast automatic labeling program works to enhance performance in labeling.	3.09	0.748	Average
10	The fast automatic labeling program reduces the level of distraction and impulsivity among students.	3.08	0.739	Average
		3.44	1.792	High

This suggests that the RAN program is viewed by teachers as a valuable and effective tool in supporting students with dyslexia, particularly in enhancing their reading and cognitive skills. The results reflect a strong endorsement of the program's utility in addressing the needs of students with dyslexia from an instructional perspective.

To address the second research question, which examined the effectiveness of the teaching strategies used in the RAN program for students with dyslexia from their teachers' perspective, the researchers analyzed the arithmetic means and standard deviations for the dimension related to the effectiveness of these teaching strategies. This statistical analysis provided insights into how teachers perceived the instructional approaches implemented within the program.

The findings, as illustrated in the table below, highlight the extent to which teachers considered the teaching strategies effective in supporting students with dyslexia. These results were further

interpreted about existing literature and best practices in special education, offering a comprehensive discussion of their implications for instructional methods and classroom interventions.

Table 3.
Effectiveness of Teaching Strategies in the RAN Program

	The phrases	M	SD	Level
1	The fast automatic labeling program includes various techniques that reduce the manifestations of slow reading.	4.12	1.787	High
2	The RAN labeling program includes an "evidence-based interventions" strategy.	3.98	1.882	High
3	The RAN labeling program contains educational cards with (symbols, shapes, colors, letters, and different numbers).	3.98	1.784	High
4	The strategies of the RAN naming program work on mastering reading and visual tracking skills.	3.96	1.748	High
5	The strategies of the RAN program work on improving the five principles of reading: phonemic awareness, fluency, phonics, vocabulary, and comprehension.	3.95	1.739	High
		3.99	1.792	High

The results presented in Table 3 indicate that the arithmetic means for the effectiveness of teaching strategies used in the RAN program ranged between 4.12 and 3.95, with an overall mean of 3.99, reflecting a high level of effectiveness. These findings suggest that, from the perspective of teachers, the instructional strategies employed within the RAN program are highly effective in supporting students with dyslexia.

To address the third research question, which investigated the challenges faced by teachers of students with learning difficulties in implementing the RAN program, the researchers analyzed the arithmetic means and standard deviations related to this dimension. This statistical approach provided insights into the specific obstacles teachers encounter when applying the program in classroom settings.

The findings, as illustrated in the table below, highlight the nature and extent of these challenges. The results were further interpreted in relation to the existing literature on special education and intervention programs for students with dyslexia, providing a broader understanding of the barriers that may impact the program's implementation and suggesting potential strategies to enhance its effectiveness.

Table 4.
Challenges in Implementing the RAN Program

	The phrases	M	SD	Level
1	The teacher did not receive adequate training on using and implementing the RAN program.	4.03	1.677	High
2	The teacher's lack of knowledge about teaching strategies in the RAN program.	4.02	1.667	Average
3	The distraction and impulsivity in some individuals with dyslexia reduce the effectiveness of the RAN program for them.	3.22	1.884	Average
4	The lack of teachers' motivation and interest in the rapid naming program.	3.19	1.879	Average
5	Teachers find it difficult to accommodate individual learning differences in those with dyslexia.	3.19	1.876	Average
6	It is difficult for teachers to understand the feelings of those with dyslexia and to receive feedback from them about the RAN program and their level of understanding of it.	3.09	1.874	Average
		3.12	1.792	Average

The results presented in Table 4 indicate that the arithmetic means for the challenges faced by special education teachers in implementing the RAN program ranged between 4.03 and 3.09, with an overall mean of 3.12. These findings suggest that, from the perspective of teachers, the challenges associated with implementing the RAN program are of a moderate level.

This indicates that while teachers encounter certain difficulties in applying the program, these challenges are not overwhelmingly prohibitive. The results provide valuable insights into the specific barriers that may hinder the effective implementation of the program, highlighting areas where

additional support, resources, or professional development may be required to enhance its effectiveness in supporting students with dyslexia.

7. Discussion

This study provides valuable insights into the RAN program's effectiveness for students with dyslexia from the perspective of teachers in Saudi Arabia. The results show that teachers perceive the program as highly effective, aligning with previous research on early intervention's importance for students with learning difficulties.

However, the study also highlights moderate challenges in program implementation. These challenges, such as limited resources, insufficient training, and time constraints, did not significantly hinder the program's effectiveness. This finding is consistent with existing literature on the barriers educators face when using specialized programs for students with learning disabilities. The Cronbach's alpha reliability analysis confirms that the questionnaire is a consistent and dependable tool for measuring teachers' perspectives. This strengthens the validity of the findings and supports the study's conclusions.

The results suggest that while the RAN program is effective, addressing the challenges teachers face could enhance its overall impact. Professional development opportunities focused on equipping teachers with necessary skills and resources could help mitigate these barriers. In conclusion, the study emphasizes the RAN program's potential as an effective intervention, despite some challenges in its implementation. Future research should explore strategies to optimize the program's use and investigate other factors influencing its success.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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