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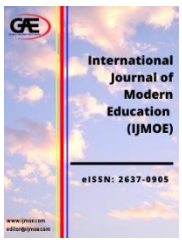

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MULTISENSORY APPROACH IN QURANIC LITERACY FOR DYSLEXIA LEARNERS: A SYSTEMATIC REVIEW

Nur Liyana Athirah Anuar[1*], Norhisham Muhamad[2]

[1] Department of Islamic Studies, Faculty of Human Science, Sultan Idris Education University, 35900 Tanjong Malim, Perak, Malaysia
Email: yumnayusra84@gmail.com
[2] Department of Islamic Studies, Faculty of Human Science, Sultan Idris Education University, 35900 Tanjong Malim, Perak, Malaysia
Email: nhisham@fsk.upsi.edu.my
[*] Corresponding Author

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Abstract:

This Systematic Literature Review (SLR) examines the application of multisensory approaches in Quranic literacy instruction for learners with dyslexia, emphasizing its pedagogical, cognitive, and technological dimensions. Quranic literacy is central to Islamic education. However, dyslexic learners often struggle with decoding Arabic script and mastering phonological patterns due to weaknesses in reading fluency, phonological processing, and working memory. To address these challenges, this review synthesizes recent empirical evidence to identify instructional frameworks that can enhance inclusive Quranic learning. Guided by the *PRISMA* protocol, a comprehensive search was conducted across *Scopus* and *PubMed*, focusing on studies published between 2021 and 2025. The search strategy, which used keywords such as dyslexia, literacy, and multisensory, initially yielded 2,843 records that were systematically screened and refined to 28 high-quality primary studies. The findings were organized into three interconnected themes: One, Assessment and Measurement, highlighting the need for reliable screening tools and culturally adapted literacy assessments. Two, Interventions, Technologies, and Instructional Approaches, demonstrating that multisensory, technology-assisted, and structured feedback methods significantly improve reading fluency, comprehension, and learner engagement. Three, Developmental, Cognitive, and Socio-environmental Factors, examining the roles of phonological awareness, motivation, family literacy practices, and teacher competencies in shaping learning outcomes. Overall, the review shows that multisensory instruction integrating visual, auditory, kinesthetic, and tactile modalities provides substantial benefits for dyslexic learners by supporting neural integration and enhancing engagement with Quranic text. The review concludes that multisensory approaches bridge cognitive science with Islamic pedagogy to support evidence-based teaching.

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Keywords:
Dyslexia, Literacy, Multisensory

Introduction

In Islamic education, Quranic literacy is a prerequisite, but the dyslexic learner is not properly supported by the traditional teacher-centered and memorization techniques. Low numbers of specialized teachers, adapted material, and standardised pedagogies do not satisfy the cognitive and sensual needs of this population group, leading to reduced engagement, self-efficacy, and limited progress. Such difficulties underscore the necessity of inclusive, dyslexia-related teaching solutions to achieve equal acquisition of Quranic literacy (Aly, 2022).

Multisensory techniques have become a more popular tool in facilitating the process of literacy learning among dyslexic students, especially in the Quranic studies. This method is based on the Multisensory Structured Language Teaching (MSLT) model and is underpinned by neurological evidence, as it involves simultaneous appeal to visual, auditory, kinesthetic, and tactile senses to improve memory and learning. When applied in accordance with the Quranic literacy concept, multisensory learning can be used to support phonological processing and decoding issues, encourage active learning, and support the needs of different types of learners. Multimodal and multiliteracies education theoretical points also highlight the need to teach students with dyslexia explicitly, provide personalized feedback, and rely on technology in order to achieve the best literacy results (Gosiewska-Turek, 2025; Indrarathne, 2022; Subramaniam & Nasir, 2024). On the whole, multisensory approaches provide a pedagogically and neurologically grounded system of inclusive teaching of Quranic literacy.

New developments in assistive technologies, such as computer-assisted platforms and mobile-based language learning services, have broadened the use of multisensory learning in the instruction of Quranic literacy. These tools provide personalized, interactive, and context-responsive learning platforms that provide immediate and explanatory feedback, which is a critical characteristic of dyslexic learner support. Study findings published within the last five years indicate that the combination of conventional multisensory techniques and digital technologies helps to increase the accuracy of reading fluency and comprehension, as well as to empower the motivation and self-efficacy of learners. However, its application is still uneven because of the constraints of teacher training, accessibility of resources and cultural modification of instructional resources (Gharaibeh & Dukmak, 2022; Pothuri & Kumar, 2025).

Overall, the integration of multisensory-based strategies of teaching Quranic literacy to learners with dyslexia is a significant step in the direction of more inclusive and evidence-based educational practice. Combining both theoretical approaches and empirical results, modern studies prove the promise of multisensory methods to overcome the problems associated with the development of the Quranic reading since time immemorial. This review summarizes the recent empirical research and conceptual models, and reports implementation challenges to give a condensed view of the current developments in the field, as well as highlighting the priorities of future scholarly inquiry.

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Literature Review

The research published during the years 2021-2024 consistently supports the validity and usefulness of multisensory approaches in the process of developing Quranic literacy in learners with dyslexia. Theories like the MSLT model underscore the need to engage the visual, auditory, kinesthetic, and tactile modalities concurrently to help children acquire literacy. Neurological studies also show that multisensory integration improves the neural specialization in print recognition and memory storage to overcome the phonological and decoding challenges mostly related to dyslexia. As an illustration, multisensory integration, as it is evidenced by handwriting and drawing activities, has been observed to be facilitated by neural lateralization. Dyslexic readers, nevertheless, might have less neural lateralization, and it is clear that specific interventions that enhance the strength of sensory processing pathways are needed (Guan et al., 2021; Indrarathne, 2022; Lachmann & Bergström, 2023).

The Multisensory Quranic literacy teaching engages direct letter knowledge, phonological awareness, decoding, and comprehension using visual, auditory, kinesthetic, and tactile sensory skills. Immediate explanatory feedback improves reading fluency, phonemic awareness, and understanding, whereas technology-assisted tools offer individual and interactive learning experiences. The success of the intervention depends on the knowledge of the teacher, and specialized dyslexia training enhances the quality of instruction and the interest of the learners (Gharaibeh & Dukmak, 2022; Hall et al., 2022; Hazaymeh et al., 2025; Indrarathne, 2022; Subramaniam & Nasir, 2024).

Empirical research in the recent past has shown that multisensory interventions can enhance Quranic and general literacy in dyslexia learners, result in fluent and better reading, improved comprehension, and enhanced self-efficacy. The effectiveness is increased when teaching is associated with immediate and explanatory feedback and personalized assistance. Inclusion of assistive technology, including gamified digital platforms and adaptive e-learning tools, offers contextually relevant, engaging learning experiences. Taken together, these outcomes point to the importance of integrated, multisensory methods of encouraging inclusive, cognitively and socio-culturally responsive literacy education in learners with dyslexia (Gosiewska-Turek, 2025; Hazaymeh et al., 2025; Salah & Kaba, 2025).

Multisensory Quranic literacy interventions are still limited by paucity of culturally-adapted interventions, lack of special teachers, and insufficient instructional tools to implement the programs in the dyslexic learners. There are also other technological barriers, such as internet access, correctness of digital feedback, and compatibility with traditional pedagogy, that limit effective use. There is also a challenge of how teachers could accommodate individual cognitive profiles and the divergent learning pace, which contributes to specific professional development, individualized feedback, and interactive engagements among the teachers, families, and communities, as an essential measure to enhance the effectiveness of the program (Alnaim, 2023; Aly, 2022; Dzulkifli et al., 2020).

Existing literature on multisensory Quranic literacy intervention by dyslexic students has some gaps, such as the lack of research on the non-traditional senses, the lack of culturally and linguistically modified interventions, as well as the lack of research on integrating technology and teacher training. The majority of interventions are based on general language or English as a second language, and not many studies focus on Quranic literacy. Randomized controlled trials should be a priority when it comes to future studies in order to determine the long-term

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effectiveness, investigate untapped sensory channels, and create culturally sensitive instruction. In addition, the opportunities of using new technologies, including virtual and augmented reality, suggest the possibility of designing an immersive, multisensory Quranic learning experience that would increase the level of engagement and the learning results (Aly, 2022; Oyedokun, 2024; Solichah & Fardana, 2024; Subramaniam & Nasir, 2024).

Synthesis

Within the last five years, multisensory strategies of teaching Quranic literacy to dyslexic learners have been developed, integrating conventional sensory modalities and assistive technology with adaptive feedback, leading to increased reading fluency, understanding, and self-efficacy of the learners. However, there are still some issues linked to cultural adjustment, teacher preparedness, and the accessibility of resources, which demonstrate the necessity of additional research. To come up with more inclusive, effective, and culturally responsive Quranic literacy interventions that can be used to address the dyslexic learners, it is important to address these gaps.

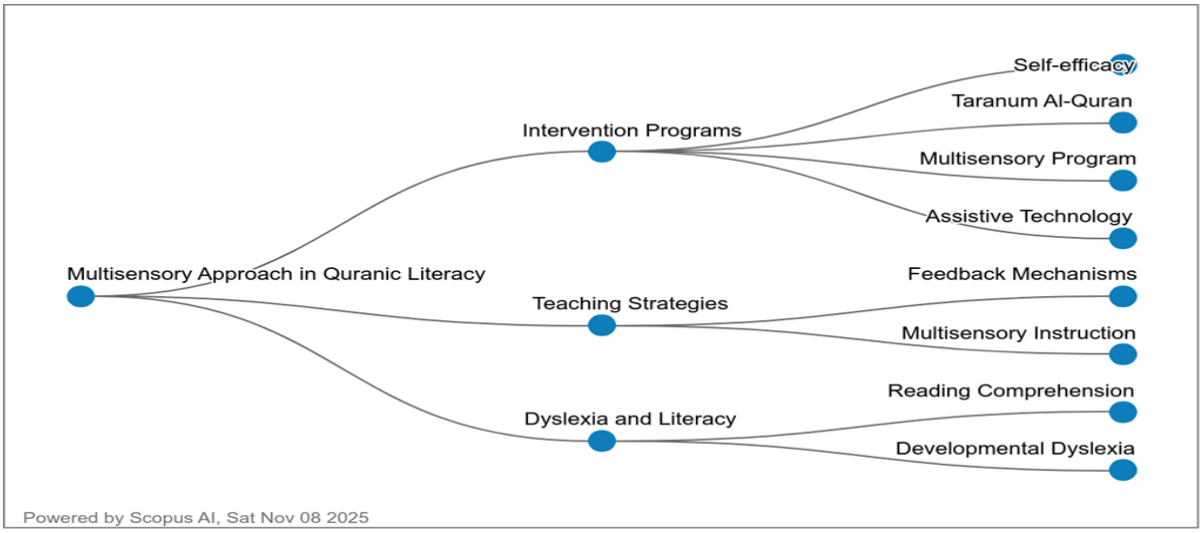

Figure 1: The Conceptual Framework of the Multisensory Approach in Quranic Literacy for Dyslexia Learners

The conceptual structure of literature used in the *Multisensory Approach to Quranic Literacy among Dyslexia Learners* is presented in Figure 1. It includes three key areas: **intervention programs, teaching strategies, and dyslexia and literacy**. The first area, intervention programs, focuses on the application of structured support systems using the combination of multisensory programs, assistive technology, and Quranic components like taranum to increase engagement and motivation in the learners. These interventions are aimed at enhancing self-efficacy in dyslexic learners by creating a feeling of accomplishment and confidence in learners through interactive learning instruction processes that include sensory interventions. Assistive technology integration with audio-visual and physical tools further customizes the instruction, allowing learners to read the Quranic text using a variety of sensorial channels. The second area, teaching strategies, deals with instruction methods that enable multisensory teaching and effective feedback methods.

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The Quranic literacy multisensory strategies can effectively meet the cognitive needs of dyslexic learners using repetition, phonological awareness, kinesthetic reinforcement, and constructive feedback to facilitate learning, autonomy, and correction of errors. Dyslexic children are facing problems with decoding Arabic script and understanding Quranic text because of the issues related to phonological and working memory, but a combination of visual, auditory, and tactile memory helps improve neural processing and reading fluency. Effective Quranic literacy models, therefore, necessitate personalized interventions, flexible instruction, and consideration of literacy issues. Incidentally, the idea of embedding the culturally relevant practices, including taranum, along with the assistive technologies, will encourage an inclusive, engaging, and evidence-based teaching process that will lead to cognitive and emotional growth of dyslexic learners.

Research Question

A Systematic Literature Review (SLR) has research questions because they guide the scope, direction, and focus of the research. They help determine what studies to include and what ones to exclude to ensure relevance and reduce the amount of possible bias. Proper research questions will help in conducting a thorough literature search, help organize and analyze data, and make a meaningful synthesis of results. They also increase transparency, clarity, and reproducibility, which facilitates the ability of other researchers to verify or expand the review. Finally, well-constructed research questions bring the SLR to the main goals of the study and are the basis of a rigorous and focused review.

The formulation of research questions represents a pivotal task in preparing an SLR, serving as the foundation that shapes the review's methodology and direction (Kitchenham & Charters, 2007). In this paper, the purpose of the SLR is to find and examine the contemporary situation in the research. The PICo framework of a mnemonic is frequently utilized in qualitative research, and it was used to structure the research questions (Lockwood & Porritt, 2022). PICo is an abbreviation that is used to describe Population, Interest, and Context, and each of the elements offers a systematic framework for creating narrow and pertinent research questions.

1. Population (P): the group or participants of interest in the study, such as a specific demographic, learner group, or community.
2. Interest (I): the main focus, phenomenon, or issue examined in the study, including experiences, behaviors, or interventions.
3. Context (Co): the setting or environment in which the population and interest are situated, which may include cultural, educational, or geographical contexts.

The PICo framework helps in the clarity and systematization of the research questions because they are broken down into these three components. This systematic approach enhances the relevance of the review and allows for identifying the relevant literature more effectively. According to this framework, the following three research questions were developed in the present study:

RQ1. Among students with dyslexia learning the Quran (P), how accurate and valid are the existing screening and diagnostic measures (I) when applied within multisensory Quranic literacy contexts (Co)?

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RQ2. For dyslexic learners reading the Quranic (P), what effects do multisensory instructional approaches and supportive technologies (I) have on Quranic literacy outcomes (Co)?

RQ3. Among dyslexic learners engaged in Quranic literacy (P), how do cognitive factors (e.g., phonological awareness, working memory) and socio-environmental influences (e.g., family literacy practices, teacher perceptions) (I) shape their progress and outcomes in multisensory Quranic literacy programmes (Co)?

Material and Methods

To conduct SLRs, the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)* methodology, suggested by Page et al. (2021), is a standard, well-known methodology to make the process of the review transparent, complete, and consistent. The PRISMA guidelines help researchers to increase the rigour and accuracy of their analyses by means of systematic identification, screening, and inclusion of relevant studies. It also focuses on the importance of randomized studies because they help in reducing the effect of bias and offer more evidence to the findings of the review. Two significant databases, *Scopus* and *PubMed,* were used in the study to retrieve data due to their extensive coverage and reliability.

PRISMA model is a model that consists of four major phases, namely, identification, screening, eligibility assessment, and data extraction. In the identification phase, all studies that can be of interest are identified by conducting extensive searches in the databases. These records are then filtered at the screening stage based on the accepted inclusion and exclusion criteria to weed out inappropriate or poor-quality sources. During the eligibility phase, the rest of the articles are carefully reviewed so that it can be ensured that they meet all the necessary requirements. Data extraction is the last step. This entails the gathering and synthesis of important information obtained by the selected studies to produce valid and meaningful information. This is a systematic and transparent process that enhances the integrity of the methodology, and the results can be reliably used to inform future research and practice.

Identification

The identification phase is the initial point of the SLR process, which, as stated by the PRISMA framework, is about the overall search and retrieval of all potentially relevant studies. The Scopus and PubMed databases were chosen in this study because they cover a wide area, are reliable, and relevant to their citation in scholarly research. A total of 2,843 records were located using the search string *dyslexi* AND (literacy OR multisensory**), 1,913 records were found in Scopus, and 930 records were determined in PubMed. Both databases were critical to guarantee the breadth and depth of the literature search, as Scopus has extensive multidisciplinary indexing, whereas PubMed is very representative of educational, psychological, and health-related research that might relate to dyslexia and literacy interventions. Such a balanced mix made the data more comprehensive and reduced publication bias, which means that no essential empirical and theoretical literature sources were missed.

The preliminary identification stage focuses on systematic and clear search methods with the aim of ensuring methodological rigor. The smart use of search terms, e.g., *"dyslexi*"* and *"multisensor*,"* helped to retrieve various terms used in the literature, which represents the growing interest of researchers in the idea of multisensorial approaches to dyslexic learners in Quranic literacy. This meticulous process forms a strong background to the screening process

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and can only include high-quality and relevant studies that form a strong validity and reproducibility of the overall review.

Table 1: The Search String

Scopus	TITLE-ABS-KEY (dyslexi* AND (literacy OR multisensor*)) AND PUBYEAR > 2020 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , “ar”)) AND (LIMIT-TO (SRCTYPE , “j”)) AND (LIMIT-TO (LANGUAGE , “English”)) AND (LIMIT-TO (OA , “all”)) **Date of Access: November 2025**
Pubmed	("dyslexi*"[All Fields] AND ("literacies"[All Fields] OR "literacy"[MeSH Terms] OR "literacy"[All Fields] OR "literacys"[All Fields] OR "multisensor*"[All Fields])) AND ((y_5[Filter]) AND (classicalarticle[Filter] OR clinicaltrial[Filter] OR historicalarticle[Filter] OR introductoryjournalarticle[Filter] OR meta-analysis[Filter] OR randomizedcontrolledtrial[Filter])) Date of Access: November 2025

Screening

During the screening stage of the PRISMA model, there were 2,843 records in the first pool, which were strictly filtered to only keep the studies with inclusion criteria defined in the initial stages. Once the screening criteria were used, 279 records were left, 264 from Scopus and 15 from PubMed. The exclusion criteria were also systematic, which was aimed at maintaining the relevance, quality, and academic integrity of the review. In particular, records that were published prior to 2021, articles in non-English languages, conference papers, book chapters, review papers, and in-press publications were eliminated. These were the criteria: only recent, peer-reviewed, and original research articles were incorporated, so that the review would capture the latest and most dependable materials in the field. Besides, five duplicate records were removed to avoid redundancy and enhance the accuracy of the dataset.

The screening phase was thus important in improving the rigor of the review through the narrowing down of high-quality empirical studies that were recent and also eliminating sources that were older or secondary in nature. This procedure enhanced the validity, reliability, and general suitability of the review, building a robust base on further eligibility determination and synthesis of research on multisensory methods in the studies of literacy and dyslexia.

Table 2: The Selection Criterion Is Searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	2021 – 2025	< 2021
Source type	Journal (Article)	Conference, Book, Review
Publication Stage	Final	In Press

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Eligibility

During the PRISMA eligibility phase, 274 full-text articles were evaluated critically with regard to relevance, methodological appropriateness, and adherence to the review purpose. Two hundred and forty-five studies were eliminated because they were beyond the scope of the research, had no substantial titles or abstracts, or full-texts were not accessible. This strict screening helped to eliminate the huge number of high-quality and directly relevant studies to a final 28 papers, which gave a strong basis to the qualitative synthesis about multisensory approaches in literacy and dyslexia.

The screening phase guaranteed conceptual and methodological rigor by eliminating irrelevant or inaccessible studies, which left 28 peer-reviewed articles. It is a curated body of evidence that aids in a narrow scope of synthesis of multisensory techniques in promoting Quranic literacy in dyslexic students, ensuring transparency, reproducibility, and compliance with the rigor of scholarly research.

Data Abstraction and Analysis

This study applied an integrative analysis to review and synthesize a variety of research designs, with special focus on qualitative research designs. The approach allowed identifying the main themes and subthemes, which conform to the aims of the study. The analysis started with the data collection stage. This was the basis of elaborating the thematic structure. The authors examined 28 chosen publications as depicted in Figure 2, and extracted the statements and content that were related to multisensory strategies in Quranic literacy among dyslexic students. The study process and results of each research were discussed step by step to provide a full picture and explain the available evidence properly.

The authors used a strict, repetitive thematic analysis, which developed general themes, as well as subthemes, using reviews of the literature and contextual applicability. It was done through a detailed analytical log of reflections, emerging patterns, and interpretive decisions to guarantee transparency and traceability. Cross-comparison between results enabled the resolution of differences by a team consensus and improved the credibility, reliability, and richness of the thematic synthesis, and offered a strong basis to comprehend multisensory learning in Quranic literacy among dyslexic learners.

Quality of Appraisal

Based on the guidelines suggested by Barbara Kitchenham (2007), after the identification of the primary studies, which refer to original research articles, papers, or documents directly included in the systematic review. The particular study should be evaluated in terms of the Quality Assessment (QA) to estimate the methodological rigor of the study, as well as to allow equal comparisons across the studies. This study used the QA model by Abouzahra et al. (2020). This model comprises six QA requirements. The rating scale consisted of three possible outcomes, which were used to rate each criterion: Yes (Y), with a score of 1 when the criterion was met completely, partly (P), with a score of 0.5 when the criterion was partially met, and No (N), with a score of 0 when the criterion was not met.
The six QA criteria were as follows:

- QA1: Is the purpose of the study clearly stated?
- QA2: Is the interest and usefulness of the work clearly presented?

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• QA3: Is the study methodology clearly established?

• QA4: Are the key concepts of the approach clearly defined?

• QA5: Is the work compared with, or evaluated against, similar studies?

• QA6: Are the study's limitations clearly acknowledged?

The table shows the QA process that was applied to each study regarding these pre-defined criteria. Three scholars who reviewed and rated the studies independently rated the studies with a Yes, Partly, or No on each criterion. The scores were then summed up to come up with a total mark for each study. A study had to score more than 3.0 in order to be present in the next analysis stage. This cut-off was used as a methodological quality control, limiting the studies that only showed sufficient rigor for further review.

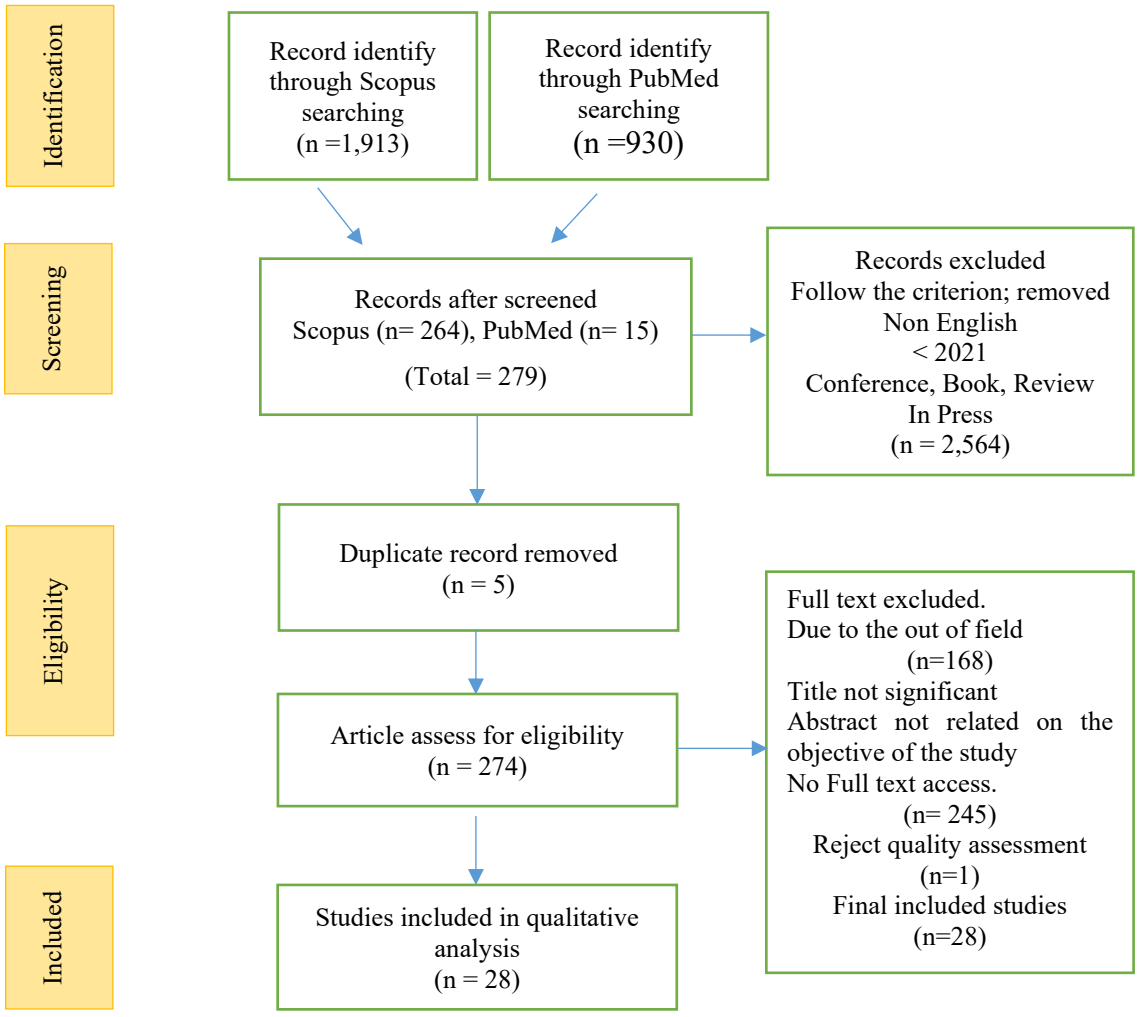

Figure 2. Flow Diagram of The Proposed Searching Study [1]

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Results and Findings

Table 4 reflects the scores of the quality of the chosen primary studies based on the QA. All of the studies were rated through six QA questions (QA1-QA6), and the answers were either Y (Yes), P (Partly), or N (No). The percentages and the total scores were computed to know the quality of methodology used in each study.

These results indicate that most of the studies were well compliant with the quality requirements, with 20 of the 29 studies recording an overall score of 5.0 (83.3%). A smaller group of studies obtained scores ranging from 2.5 (41.7%) to 4.5 (75.0%), indicating partial fulfillment of certain methodological requirements. Overall, the results suggest that the selected primary studies generally exhibit good methodological rigor, thereby supporting their inclusion in the systematic review.

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Table 4: Quality Assessment Results Of Selected Primary Studies

PS	QA1	QA2	QA3	QA4	QA5	QA6	Mark	%
1	**Y**	**Y**	**P**	**P**	**N**	**N**	**2.5**	**41.7%**
2	Y	Y	Y	Y	P	N	4.5	75.0%
3	Y	Y	Y	Y	Y	N	5.0	83.3%
4	Y	Y	Y	P	Y	N	4.5	75.0%
5	Y	Y	Y	Y	Y	N	5.0	83.3%
6	Y	Y	Y	Y	P	N	4.5	75.0%
7	Y	Y	Y	Y	Y	N	5.0	83.3%
8	Y	Y	Y	Y	Y	N	5.0	83.3%
9	Y	Y	Y	Y	Y	N	5.0	83.3%
10	Y	Y	Y	Y	Y	N	5.0	83.3%
11	Y	Y	Y	Y	P	N	4.5	75.0%
12	Y	Y	Y	Y	Y	N	5.0	83.3%
13	Y	Y	Y	Y	Y	N	5.0	83.3%
14	Y	Y	Y	Y	Y	N	5.0	83.3%
15	Y	Y	Y	Y	Y	N	5.0	83.3%
16	Y	Y	Y	Y	Y	N	5.0	83.3%
17	Y	Y	Y	Y	Y	N	5.0	83.3%
18	Y	Y	Y	Y	P	N	4.5	75.0%
19	Y	Y	Y	Y	Y	N	5.0	83.3%
20	Y	Y	Y	Y	P	N	4.5	75.0%
21	Y	Y	Y	Y	Y	N	5.0	83.3%
22	Y	Y	Y	Y	Y	N	5.0	83.3%
23	Y	Y	Y	Y	P	N	4.5	75.0%
24	Y	Y	Y	Y	Y	N	5.0	83.3%
25	Y	Y	Y	Y	Y	N	5.0	83.3%
26	Y	Y	Y	Y	Y	N	5.0	83.3%
27	Y	Y	Y	Y	Y	N	5.0	83.3%
28	Y	Y	Y	Y	Y	N	5.0	83.3%
29	Y	Y	Y	Y	P	N	4.5	75.0%

Theme 1: Assessment & Measurement

Below is a focused literature synthesis on Assessment and Measurement derived solely from the findings and discussion portions of the provided abstracts. Each paragraph groups related findings from at least three of the supplied studies and synthesizes their implications for screening and assessment of reading difficulty and dyslexia in multilingual and cross-cultural contexts.

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Assessment instruments and cross-cultural validity considerations emerge repeatedly as central concerns. Pamei et al. (2023) emphasized that operational definitions of reading literacy and the specificity of scripts and languages strongly influence measurement outcomes and cross-country comparisons, warning that large-scale assessments risk mischaracterising reading ability when contextual language factors are ignored. Pye & Chan (2023) indicated that dynamic testing may reduce language bias, showing comparable performance across alphabetic and morphosyllabic readers, though its predictive accuracy is mainly limited to alphabetic orthographies. According to (Rhinehart & Gotlieb, 2023), evidence from early screening indicates that universal assessments did not over-identify English Learners as at-risk, and English Learners (ELs) performed comparably to peers on literacy subskills. This highlights that both test design and scoring significantly influence cross-linguistic identification accuracy, with no single method fully resolving validity concerns.

There is strong evidence relating to predictive power, classification stability, and the necessity of differentiated interpretation of screener results. Miciak et al., (2022) utilized latent profile and mixture modeling on late-elementary ELs and found stable classes (*reading disabled versus typically developing*) that had different code and sense-based deficits. The membership of classes was very stable over an academic year, and the reading-disabled class had less improvement in comprehension, suggesting that the classes were in need of long-term remediation. Rhinehart & Gotlieb, (2023) discovered that first-grade universal screeners tended to produce similar literacy subskill profiles for ELs and non-ELs and did not over-detect language learners at risk, meaning that when designed correctly, early screeners can operate without an inappropriate cultural or language bias. As Pye & Chan (2023) pointed out, dynamic testing demonstrates potential in the prediction of difficulties with reading, but the sensitivity to the measure of proficiency is lower, with lower sensitivity to language-specific influences and varying predictive utility depending on the orthographies. These results support multi-metric measurements, which incorporate progress monitoring and other formats to make the identification more accurate and predict how a person would perform in the long term in literacy.

Practical implications to assessment design and policy focus on situationalization, multimodal assessment, and unwarranted interpretation of screening findings. According to (Pamei et al., 2023), interdisciplinary, context-sensitive solutions must be applied when developing and interpreting literacy measures, particularly in Southeast Asian environments where the heterogeneity of scripts and languages is the rule, so that prevalence estimates and diagnostic inferences can be made. Combined, Miciak et al., (2022) and Rhinehart & Gotlieb, (2023) suggested that stability analysis and follow-up diagnostics should be included in screening systems in order to differentiate transient low performance and persistent reading disorder. Results of early screener pass/fail testing should be supplemented with component skill analysis to determine the intensity and duration of intervention. Collectively, the findings highlight the importance of culturally and linguistically sensitive assessment tools that combine static and dynamic measures, profile-based classification, and longitudinal tracking to ensure accurate identification and effective support for learners.

Theme 2: Interventions, Technologies & Instructional Approaches

Formal academic literature review synthesis on Interventions, Technologies & Instructional Approaches *(based on findings and discussion sections of provided abstracts only)*. Each

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paragraph integrates studies that address similar issues; author names are cited in-text, and full source blocks are listed in the final paragraph exactly as provided.

Multimodal and multisensory interventions demonstrate measurable improvements in foundational reading components for learners with dyslexia and for English language learners. Hazaymeh & Khasawneh (2025), reported statistically significant gains in reading fluency and comprehension for dyslexic English language learners following multimodal instruction, with positive correlations between learners' favourable perceptions of the method and skill improvement. Eryılmaz & Balcı (2025), stated that computer-assisted multisensory training enhanced word reading and phonological awareness, yet deficits in reading comprehension and speed remained compared to those of typically developing peers. The meta-analytic synthesis by (Ruan et al., 2024) established that interventions produce moderate-to-large benefits, with fluency, working memory, and phonological-orthographic-morphological training. It demonstrated that particularly strong effects, especially for children with dyslexia. Together, these findings indicate that multimodal and multisensory programmes can strengthen component reading skills. However, persistent differences in comprehension and speed suggest the need for targeted follow-up components within intervention packages (Hazaymeh & Khasawneh, 2025; Eryılmaz & Balcı, 2025; Ruan et al., 2024).

Digital and game-based designs enhance engagement and can support targeted phonological and literacy outcomes when pedagogical alignment and user involvement guide development. Kritsotaki et al., (2025) observed large effect sizes in writing and related cultural/critical learning following a digital storytelling pilot, suggesting potential for classroom application when process and product are jointly attended. Brennan et al., (2022) discovered that co-design with children and teachers produced greater investment and observable gains in phonological awareness within the Cosmic Sounds toolkit, with increased engagement accompanying skill progress. Benton et al., (2021) emphasized design tensions for adaptive literacy games, balancing replay ability, pedagogical consistency, and learner diversity, and recommended multidimensional adaptivity to maintain optimal challenge for groups, including children with dyslexia. Rodríguez-Cano et al., (2022) identified seven development areas for VR-based intervention design through stakeholder consultation, highlighting VR's potential to enhance visuospatial practice and inclusion. Collectively, these studies suggested that technology-mediated interventions yield pedagogical gains when design is informed by target-user needs, adaptive mechanisms, and co-design processes (Kritsotaki et al., 2025; Brennan & Rodríguez-Cano et al., 2022; Benton et al., 2021).

Intervention reach and effectiveness are moderated by implementation factors, ethical accessibility, and home-based practices. According to (Jozipović & Lenček, 2024), the simplified linguistic and visual changes are essential to guarantee the valid consent and accessible dyslexia resources. The quality of shared storybook reading does not vary based on the family risk of dyslexia, and the language proficiency of mothers affects interaction, which makes it appropriate to use as an early literacy intervention (Hamilton et al., 2021). The nature of the implementer and mode of delivery have an important effect on intervention outcomes, as researcher-led or co-facilitated group interventions have a stronger impact than parent-led or individual ones, and the importance of fidelity and scalability on program effectiveness is critical (Ruan et al., 2024). The evidence showcases the significance of available resources, training of implementers, and home reading support with regard to caregiver language and ethical communication. The results underline the importance of providing the required access

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to resources, proper training of implementers, and efficient home-based reading assistance and managing the language proficiency of caregivers and ethical communication (Jozipović & Lenček, 2024; Hamilton et al., 2021; Ruan et al., 2024).

The latest findings suggest that multisensory and multimodal interventions are effective in improving the foundations of reading, with the possible shortcomings in the areas of comprehension and processing speed, which would need supplemental assistance (Hazaymeh & Khasawneh, 2025; Eryılmaz & Balcı, 2025; Ruan et al., 2024) Second, co-designed, adaptive, pedagogically coherent Technology-based approaches increase learner engagement and produce measurable gains in literacy, and tools such as VR and gamified applications have potential, but require careful design (Kritsotaki et al., 2025; Brennan & Rodríguez-Cano et al., 2022; Benton et al., 2021). Third, the accessibility, ethical communication, competence of the implementers, and contextual supports, such as the language proficiency of caregivers and the format of intervention, are also factors associated with successful implementation (Jozipović & Lenček, 2024; Hamilton et al., 2021; Ruan et al., 2024). Altogether, the outcomes of these studies reinforce the idea that integrated programs incorporating multisensory teaching, properly designed educational technologies, and implementation strategies with fidelity and inclusivity should be established.

Theme 3: Developmental, Cognitive & Socio-environmental Factors

Preliterate children with a family history of dyslexia have lower phoneme awareness and slower rapid automatized naming despite intact statistical learning, which are some of the early cognitive indicators of literacy challenge (de Bree & van den Boer et al., 2022). Early literacy deficits in family risk children show early, pre-school emergence in phonological processing and verbal retrieval speed, thus the difference between domain literacy and general statistical learning in dyslexia studies.

There is an interaction between family risk and early language development, especially the expressive skills and future literacy. Research reveals that late-talking children, when they are two years old, develop less in language skills at the age of 4.5 and six years of age, and family risk factors also affect the acquisition of expressive grammar in the course of time (Caglar-Ryeng et al., 2021). In the same way, the interaction between Developmental Language Disorders (DLD) and dyslexia also causes spelling problems. Children with both DLD and reading impairments experience the greatest impairments (de Bree, Lammertink, et al., 2022). There is an interplay between genetics and early language environment in the development of reading and spelling.

Children with dyslexia have multifaceted spelling difficulties, which include errors in phoneme-grapheme correspondence, orthographic knowledge, and morphology (de Bree, Lammertink, et al., 2022; van Witteloostuijn et al., 2021; Cummins, 2022). Rapid naming and reading words are predictors of spelling in children with dyslexia, and they have common phonologic and orthographic impairments. Hence, specialized literacy and oral language interventions are essential. The reading of dyslexic adults is affected by socio-environmental factors and state-based enjoyment that fluctuates (Jones et al., 2025). The enjoyment of dyslexic adults does not always positively correlate with comprehension and focus on individualized motivational interventions and cognitive support.

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Attentional skills, despite their connection to literacy proficiency, do not seem to have a special impact on the benefits of remediation programs on children with dyslexia. Walda et al., (2022) discovered that the working speed had a positive relationship with decoding and spelling performance, but the level of attention did not moderate remediation progress. It means that though attentional efficiency is a contributing factor to baseline literacy skills, the applied interventions may assist in the improvement of attentional skills, regardless of the baseline attentional abilities. This type of evidence indicates that the interventions for dyslexia can be enhanced by the emphasis on structured practice and skill-building, not just the cognitive deficit of attention.

The ethical studies involving dyslexic groups require modified language and visual resources to provide informed consent and understanding (Jozipović & Lenček, 2024). Such factors, along with cognitive and literacy variations, emphasize a significant role of specific interventions in phonological awareness, reading fluency, and spelling, with emphasis on motivation and ethical communication more than statistical learning in the achievement of effective literacy outcomes.

This review demonstrates that multisensory Quranic instruction serves as an effective bridge between cognitive science and Islamic pedagogy. Contemporary research in cognitive neuroscience highlights how learners with dyslexia benefit from learning experiences that activate multiple sensory pathways, promote neural integration, and reduce cognitive load during decoding tasks. These empirically supported mechanisms align strongly with traditional Islamic teaching practices such as talaqqi, musyafahah, repetition, and guided modeling, which naturally embed visual, auditory, and kinesthetic engagement. By integrating evidence from cognitive science with the established principles of Quranic pedagogy, this review provides a theoretically grounded framework that strengthens the rationale for multisensory approaches and advances the development of culturally responsive, inclusive, and evidence-based instructional models for Quranic literacy. Such alignment underscores the potential for modern scientific insights to enhance Islamic educational traditions while addressing the diverse learning needs of dyslexic learners.

Conclusion

The goal of this SLR was to critically examine the current empirical-theoretical research in the Multisensory Approach to Quranic Literacy among Dyslexia Learners through the prism of recent works published within the last 4 years (2021-2025) in the *Scopus* and *PubMed* databases. The PRISMA-based review has identified, screened, and synthesized 29 high-quality studies that fit the inclusion criteria, focusing on evidence-based interventions, sensory-based instructions, and cognitive development in dyslexic learners. The review aimed to provide answers to three primary research questions, namely, the reliability of diagnostic instruments in multisensory Quranic literacy contexts, the impact of multisensory and technology-mediated teaching on the Quranic literacy performance, and the role of cognitive and socio-environmental factors in the improvement of dyslexic learners. The general purpose was to fill this significant gap in the literature on multisensory teaching and in the study of the Islamic education pedagogy by providing a structured and integrative synthesis of how multisensory teaching techniques might add to the Quranic reading and understanding abilities in learners with dyslexia.

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The synthesis of findings revealed several consistent patterns and emerging themes across the reviewed studies. Multisensory instruction grounded in visual, auditory, kinesthetic, and tactile integration demonstrated strong efficacy in improving phonological awareness, reading fluency, and comprehension among dyslexic learners. The combination of traditional sensory-based strategies with digital and mobile-assisted tools was demonstrated to enhance learner motivation, engagement, and self-efficacy, confirming the cognitive and emotional benefits of interactive learning. The review identified three dominant domains shaping this field: one, intervention programs, where multisensory and technology-enhanced activities fostered meaningful engagement. Two, teaching strategies, emphasizing explicit, systematic instruction and immediate feedback. Three developmental and socio-environmental factors highlight how phonological deficits, attention, family support, and teacher competence collectively influence learning outcomes. The analysis also noted that integrating culturally relevant elements, such as taranum and Arabic phonetics, strengthens learners' connection to Quranic content, ensuring both educational and spiritual enrichment. However, persistent gaps remain in culturally adapted instructional design, teacher training, and accessibility of assistive technologies. Despite these challenges, the collective evidence underscores that multisensory approaches provide a pedagogically sound and neurologically informed foundation for inclusive Quranic literacy education.

The review contributes substantially to the growing discourse on inclusive Islamic education by synthesizing fragmented knowledge across literacy, neuroscience, and pedagogy into a coherent framework for Quranic literacy. It extends prior studies by contextualizing multisensory principles within the linguistic and spiritual dimensions of Quranic instruction, offering a novel perspective rarely addressed in mainstream dyslexia research. The evidence supports the conceptualization of a multisensory Quranic literacy model that integrates explicit phonological instruction, sensory-rich experiences, and culturally embedded practices. Practically, these findings hold significant implications for educational policy and classroom application. Teachers and curriculum designers are encouraged to incorporate multisensory tools, tactile resources, and feedback-based systems to facilitate individualized Quranic learning. The findings also suggested that institutional collaboration among educators, parents, and specialists is essential for effective implementation, particularly in developing nations where access to specialized instruction is limited.

Nevertheless, several limitations were acknowledged. The inclusion of English-language studies only and the restriction to 2021–2025 publications may have excluded relevant regional research or non-indexed empirical works. Variability in methodological rigor among included studies and the limited representation of Arabic-language educational contexts also constrain the generalizability of findings. Future research should therefore expand to cross-linguistic and cross-cultural contexts, integrating longitudinal and experimental designs to measure the sustained effects of multisensory Quranic instruction. Further exploration of emerging technologies such as virtual and augmented reality could deepen sensory immersion and accessibility for dyslexic learners. Additionally, developing standardized training modules for Quranic educators on multisensory pedagogy would help ensure fidelity and equity in instructional delivery.

In conclusion, this review reinforces the significance of adopting multisensory approaches as an inclusive and evidence-based pathway for enhancing Quranic literacy among learners with dyslexia. By bridging neuroscientific understanding, educational theory, and Islamic

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pedagogy, the study establishes a comprehensive foundation for future innovations in Quranic teaching. Hence, conducting systematic reviews in this domain is vital to advancing evidence-based practice and ensuring that educational interventions for special needs learners are both scientifically validated and spiritually meaningful. The integration of sensory-based instruction strengthens cognitive outcomes and nurtures emotional connection and faith-based learning, embodying a holistic vision of literacy that transcends conventional pedagogical boundaries.

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Appendix

No	Authors	Title	Year	Source title	SCOPUS	PubMed
1	Iliska, D.; Gudonienė, D. (Iliska & Gudonienė, 2025)	Sustainable Technology-Enhanced Learning for Learners with Dyslexia	2025	Sustainability (Switzerland)	/	
2	Kritsotaki, K.; Castro–Kemp, S.; Kamenopoulou, L. (Kritsotaki et al., 2025)	Digital storytelling: An educational approach for enhancing dyslexic children's writing skills, critical and cultural learning	2025	Journal of Research in Special Educational Needs	/	
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