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Innovative Approaches to Cognitive Assessment in Children with Special Needs: A Systematic Literature Review

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Abstract

Cognitive assessment is essential for enhancing educational outcomes for children with special needs, as it identifies individual learning requirements and informs tailored interventions. This systematic literature review aims to synthesize empirical studies focusing on innovative cognitive assessment for children with special need methodologies from 2000 to 2025. Utilizing a structured approach, the review analyzes studies that explore various assessment techniques, including technology-driven tools and dynamic assessments. The findings reveal significant advancements in cognitive assessment practices, highlighting innovative approaches such as game-based assessments and dynamic learning maps that actively engage children and promote cognitive development. These methods not only assess cognitive abilities but also align with the principles of individualized education plans, ensuring that educational strategies are tailored to each child's unique strengths and weaknesses. However, critical gaps persist in current assessment practices, particularly the lack of standardized tools designed for diverse populations and insufficient reliability in existing motor intelligence assessments. The implications of these findings emphasize the need for ongoing research to develop effective assessment tools that accurately reflect the cognitive abilities of children with special needs. This study contributes to the existing knowledge based by identifying effective cognitive assessment methodologies and highlighting areas for future research.

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Introduction

Cognitive assessment plays a crucial role in enhancing educational outcomes for children with special needs by providing structured methods to identify individual learning requirements, strengths, and areas necessitating intervention. Tailored cognitive assessments are essential for developing personalized educational strategies that can significantly improve cognitive and learning outcomes, which are critical for fostering inclusivity in educational environments. Cognitive assessments are defined as systematic evaluations designed to measure a child's cognitive functions, such as memory, attention, language skills, and executive functions, which are pivotal in their overall educational development (Barida & Muarifah, 2019).

Cognitive assessments for children with special needs are essential tools for identifying cognitive strengths and weaknesses, which aid in the development of tailored educational interventions. These assessments typically comprise standardized tests and innovative methods designed to evaluate various cognitive functions, including memory, attention, and problem-solving abilities (Lee & Luellen, 2020; Wee & Lee, 2023). The range of these assessments encompasses children diagnosed with disabilities such as autism spectrum disorder (ASD), learning disabilities (LD), and intellectual disabilities (ID), facilitating the creation of individualized education plans (IEPs) that address specific learning challenges (Lu et al., 2024).

The significance of cognitive assessments in enhancing educational outcomes for children with special needs is well-documented. Research indicates that early and precise cognitive evaluations are positively associated with improved educational performance and developmental outcomes. For example, Lee and Luellen (2020) found that children with disabilities who participated in structured early education programs like Head Start experienced cognitive gains, especially when interventions matched their assessed needs. Furthermore, cognitive assessments can aid in developing intervention strategies that foster social skills and adaptive behaviors, which are critical for the overall development of children with special need (Don & O'Byrne, 2020).

Recent innovations in cognitive assessment methodologies underscore the integration of technology and new theoretical frameworks. The advent of artificial intelligence (AI) and robotics in assessments presents a promising avenue. For instance, studies have shown that humanoid robots can enhance the cognitive and social skills of children with disabilities, providing a more interactive and engaging assessment environment compared to traditional methods (Syriopoulou-Delli & Gkiolnta, 2021). Moreover, game-based cognitive training programs have emerged as successful strategies, demonstrating significant improvements in cognitive performance among children with intellectual disabilities (Kim & Lee, 2021). These innovative approaches aim not only to assess cognitive abilities but also to actively engage children in their learning processes.

The novelty of this systematic literature review (SLR) lies in its comprehensive examination of the latest advancements in cognitive assessment tools specifically designed for children with special need. By synthesizing empirical studies published between 2000 and 2025, this review seeks to bridge the existing knowledge gap regarding innovative assessment methodologies, particularly those that leverage technology and interactive strategies. Unlike previous reviews that may have focused primarily on traditional assessment methods, this SLR

emphasizes the impact of cutting-edge tools, such as virtual reality and AI-driven assessments, on the cognitive evaluation process. This focus on innovation not only highlights the evolving landscape of cognitive assessments but also aims to provide educators and practitioners with actionable insights into effective practices that can enhance educational outcomes for children with autism and other disabilities.

Empirical studies focusing on innovative cognitive assessment tools illustrate their efficacy in accurately diagnosing and addressing the needs of children with special needs. Previous pilot study highlighted how virtual reality combined with cognitive therapy improved visual-motor integration in children with intellectual disabilities, showcasing the potential benefits of merging technology with therapeutic practices. Similarly, the development and validation of the Computerized Adaptable Test Battery revealed significant improvements in assessing children's cognitive functions, providing real-time feedback for educators (Billard et al., 2021). Certain cognitive assessment tools have been found particularly effective for children with autism and other disabilities. The Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-ch) has been effectively utilized, offering insights into various cognitive functions relevant for educational planning (Wee & Lee, 2023). Furthermore, traditional assessment tools, such as the Wechsler scales, have been recognized as valuable in accurately identifying strengths and weaknesses among children with ASD (Smith et al., 2022).

The objectives of this systematic review are twofold: first, to systematically synthesize empirical studies focusing on innovative cognitive assessments for children with special needs, and second, to identify effective, efficacy, and gap in implementing cognitive assessment tools that cater specifically to this population. By examining literature published between 2000 and 2025, this review will emphasize studies that focus on children with autism and other disabilities, thereby addressing a significant gap in the current understanding of cognitive assessments. Key terms relevant to this review include "cognitive assessment," which refers to the evaluation of various cognitive functions; "Special need Children," which denotes the specific requirements of children with disabilities; and "innovative approaches," which highlight the new methodologies and technologies being integrated into cognitive assessments. As the field of cognitive assessment continues to evolve, it is imperative that educators, clinicians, and researchers remain informed about innovative tools and methods that can enhance the assessment process and, ultimately, the educational outcomes for children with special need. This systematic review aims to contribute to that knowledge base, offering insights into effective practices and highlighting areas for future research.

Method

Research Design

This research employs a Systematic Literature Review (SLR) approach to examine innovative methods used in cognitive assessments for children with special needs. The SLR framework provides a structured, transparent, and replicable process for analyzing existing literature, in line with internationally recognized standards. To maintain rigor and clarity, the review is conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, ensuring adherence to high-quality reporting practices.

Data Collection

An extensive search strategy was designed to locate relevant peer-reviewed publications, utilizing the Scopus database with predetermined keywords and Boolean operators. The Boolean Operator constructed a query in Scopus database such as: (TITLE-ABS-KEY ((cognitive AND assessment OR intelligence AND assessment) AND special AND need AND children) AND PUBYEAR > 1999 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English"))). These Boolean search string emphasized keywords associated with “cognitive assessments” and “special needs children” to ensure the retrieval of highly pertinent studies. A reference management tool was employed to remove duplicate records. Figure 1 provides a visual overview of the selection process, detailing the number of articles identified, screened, evaluated for eligibility, and ultimately included in the final review.

To maintain the quality and relevance of the review, the selection of studies was guided by well-defined inclusion and exclusion criteria. Eligible studies included peer-reviewed journal articles, published between 2000 and 2025 that focused on cognitive assessment or intelligence assessment in special needs children. Studies were excluded a non-English article, the document type other than journal article (such proceeding, book chapter, etc), focused solely on either cognitive assessment or children with special need, and duplicates from the database search. The study selection followed a systematic process, starting with a review of titles and abstracts from the Scopus database to determine their alignment with the research aims. The full-text articles that met the inclusion criteria were further evaluated. A final step is conducted quality assessment by using standardized tools to ensure the methodological rigor of the selected article.

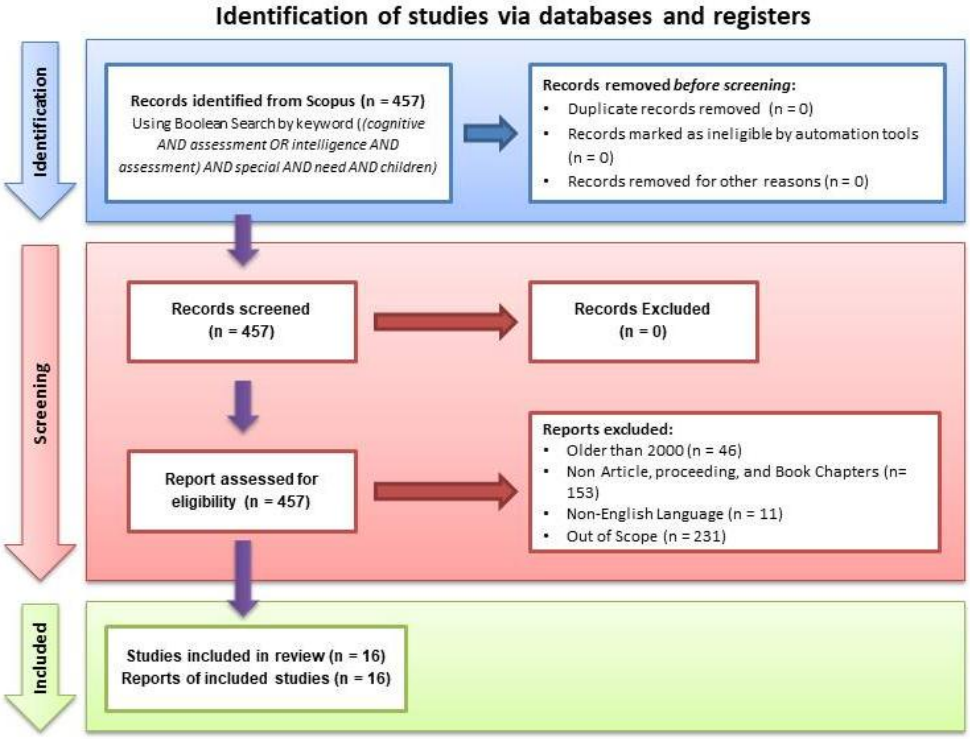

Figure 1. The PRISMA Flow Diagram detailing the Identification, Screening, and Selection Process of Literature

Data Analysis (Screening and Selection Process)

A structured data extraction form was used to consistently gather relevant information from each included study. A thematic analysis was then performed to uncover major trends and emerging patterns related to cognitive assessment for children with special need. Findings were organized according to: (1) Approaches to cognitive assessment for children with Special need; (2) Targeted element on cognitive assessment for Assessment for children with Special need; and (3) Gaps and challenges in cognitive assessment for children with special need. Although this systematic literature review followed rigorous methodological standards, certain limitations remain. One potential constraint is publication bias, which may have contributed to the underrepresentation of studies reporting null or non-significant results. Additionally, the exclusive reliance on the Scopus database may have limited the comprehensiveness of the review by omitting pertinent studies indexed in other scientific repositories.

Findings

Theme 1: Innovative Approaches to Cognitive Assessment

Cognitive assessment plays a pivotal role in enhancing educational outcomes for children with special needs. Recent advancements in assessment methodologies highlight innovative approaches that not only evaluate cognitive abilities but also actively engage children in their learning processes. Innovative cognitive assessment methods encompass both test and non-test approaches, each offering unique advantages and challenges. The distinction between these types of assessments is crucial in understanding their application and effectiveness for children with special needs. Test assessments, such as the School Function Assessment (SFA) and the Kaufman Assessment Battery for Children (KABC-II), provide structured evaluations that yield quantifiable data on cognitive abilities. In contrast, non-test assessments, including dynamic assessments and game-based methodologies, focus on interactive and qualitative measures that capture a child's cognitive engagement and learning process.

The study by Egilson & Coster (2004) illustrates the efficacy of the SFA, which evaluated participation and performance in school settings among students with physical and cognitive/behavioral impairments. The findings revealed significant challenges faced by these students, emphasizing the necessity for adapted school environments to support their learning needs. This aligns with the theoretical frameworks discussed in Section 3, which advocate for assessments that are aligned with instructional goals and tailored to the unique profiles of children with disabilities (Rebello et al., 2011; Kessel et al., 2019). The other technique explored by Lawrence & Cahill (2014) which is dynamic assessment is represented a non-test approach that gauges children's learning potential through interactive methods. The study highlighted the positive impact of dynamic assessment on children's emotional well-being and social relationships, suggesting that this method fosters a more supportive learning environment. This aligns with the framework of Individualized Education Programs (IEPs), which emphasize personalized learning pathways based on individual strengths and weaknesses (Zaheer et al., 2023; Park et al., 2023). Game-based cognitive assessment methods, such as the workshop designed by Munoz et al. (2018), demonstrate the potential for enhancing computational thinking skills among adolescents with Autism Spectrum Disorder (ASD). The findings indicated that participants showed high levels of acquired skills through

collaborative programming activities, showcasing the effectiveness of interactive learning environments. This innovative approach not only assesses cognitive abilities but also promotes engagement and motivation among children with special needs, thereby improving educational outcomes.

The integration of technology in cognitive assessments has also been highlighted in studies like that of Esposito et al. (2017), which evaluated tablet applications designed to enhance cognitive and social skills in children with ASD. The results demonstrated higher progress in cognitive skills among participants compared to a control group, reinforcing the notion that technology can play a significant role in facilitating effective cognitive assessments. This resonates with the emerging trends in educational psychology that advocate for the use of interactive and adaptive technologies to support learning for children with disabilities (Kim & Lee, 2021). Furthermore, the adaptation and validation of assessment tools, such as the Motor Intelligence Assessment Tool discussed by Zaino et al. (2025), illustrate the importance of tailoring assessments to meet the specific needs of children with intellectual disabilities. The study reported high reliability and validity in identifying sensory-motor deficits, underscoring the necessity for continuous development and refinement of assessment tools to ensure they are effective and relevant.

In reviewing the findings presented in Table 1, it becomes evident that various innovative cognitive assessment methods yield distinct advantages. For instance, the Dynamic Occupational Therapy Cognitive Assessment for Children (DOTCA-ch) has been effectively utilized to provide insights into cognitive functions relevant for educational planning (Wee & Lee, 2023). This tool exemplifies how assessments can be designed to not only evaluate cognitive functioning but also inform educational strategies that foster growth and learning. Despite the promising outcomes associated with innovative cognitive assessment methods, challenges remain. The complexity of cognitive profiles among children with special needs necessitates ongoing research and development to ensure that assessments are both valid and reliable. Additionally, practitioners must be equipped with the necessary training and resources to effectively implement these innovative approaches in practice (Koutrouba et al., 2006).

Table 1. Summary of Selected Studies on Innovative Cognitive Assessment Methods and Types for Children with Special Needs

Authors	Assessment Method	Type	Targeted Disabilities	Description of Implementation	Efficacy
Lawrence & Cahill, (2014)	Dynamic Assessment	Non-test	All type disabilities	Semi-structured interviews with children, parents, and teachers to gauge perceptions of dynamic assessment.	Positive impact on emotional well-being, learning approach, and social relationships.
Egilson & Coster, (2004)	School Function Assessment (SFA)	Test	Physical and Cognitive/Behavioral Impairments	Administered SFA to 75 students to evaluate participation and performance across	Identified challenges and highlighted the need for adapted school

Authors	Assessment Method	Type	Targeted Disabilities	Description of Implementation	Efficacy
				school settings.	environments.
Zaino et al. (2025)	Motor Intelligence Assessment	Test	Intellectual Disabilities	Adapted existing tools to assess sensory-motor integration, simplifying tasks for children with IDs.	High reliability and validity; effective in identifying sensory-motor deficits.
Munoz et al. (2018)	Assessment based on Game Building Workshop	Non-test	Autism Spectrum Disorder (ASD)	Workshop designed to teach programming through collaborative activities, enhancing computational thinking.	Participants showed high levels of acquired computational thinking skills.
Reesman et al. (2014)	Review of Assessment Measures	Non-test	Deaf or Hard of Hearing	Analyzed various intellectual assessment tools, focusing on necessary accommodations for this population.	Highlights need for further research and tailored assessment strategies.
Erickson & Geist (2011)	Dynamic Learning Maps (DLM)	Test	All type disabilities	Collected data on students' skills to inform development of alternate assessments based on achievement standards.	Data informed assessment development for better educational support.
Esposito et al. (2017)	Assessment through Tablet Applications	Non-test	Autism Spectrum Disorder (ASD)	Evaluated three apps designed to enhance attention, vocabulary, and imitation skills among children with ASD.	Showed higher progress in cognitive skills compared to control group.
Carrasuma da et al. (2006)	Experimental Tests	Test	Intellectual Disabilities	Conducted comparative studies on counting mechanisms in SEN and mainstream students using Gelman and Gallistel principles.	Identified significant differences in counting principles between groups.
Nusser & Weinert (2024)	Intensified Test Instructions	Non-test	All type disabilities	Developed and tested intensified instructions and physical activity engagement to improve comprehension of test	Improved performance in reading tests among participants.

Authors	Assessment Method	Type	Targeted Disabilities	Description of Implementation	Efficacy
				requirements.	
Peyton et al. (2021)	WIDEA-FS Assessment	Test	Special Health Needs	Validated the WIDEA-FS in assessing adaptive skills in children with special health needs compared to typically developing children.	Demonstrated construct and concurrent validity with established assessments.
Rzhanova, et al. (2025)	Kaufman Assessment Battery for Children (KABC-II), WISC-V	Test	Learning Disabilities	Investigated fluid intelligence and its relationship with cognitive characteristics in children with learning disabilities.	Found significant reductions in cognitive abilities among children with learning disabilities.

In conclusion, the findings from various studies underscore the importance of innovative approaches to cognitive assessment for children with special needs. Both test and non-test methods offer unique insights into cognitive functioning, highlighting the need for assessments that are aligned with individual learning goals and adapted to meet diverse needs. The dynamic assessments, and interactive methodologies represents a significant advancement in the quest to provide equitable and effective educational support for all learners.

Theme 2: Advancement in Cognitive Assessment

The advancement of cognitive assessment for children with special needs has witnessed significant transformations, primarily driven by technological innovations. The integration of technology into cognitive assessment practices has introduced a variety of innovative approaches, each with distinct advantages. For instance, the use of tablet applications has been shown to enhance cognitive and social skills among children with Autism Spectrum Disorder (ASD). A study by Esposito et al. (2017) demonstrated that children using specific tablet applications exhibited notable improvements in cognitive skills compared to a control group. This finding underscores the potential of technology to create interactive and adaptive learning environments that cater to the unique needs of children with special needs. The results reinforce the theoretical framework that advocates for the use of interactive and adaptive technologies in educational settings (Kim & Lee, 2021).

Similarly, the work by Munoz et al. (2018) illustrates how digital game programming workshops can effectively develop computational thinking skills in adolescents with ASD. Participants in this study not only acquired high-level skills but also displayed increased engagement and motivation throughout the learning process. This approach aligns with the principles of Individualized Education Programs (IEPs), which emphasize personalized learning pathways tailored to individual strengths and weaknesses (Zaheer et al., 2023; Park et al., 2023). The positive outcomes from game-based assessments highlight the importance of creating engaging and interactive

learning experiences for children with special needs. Further emphasizing the role of technology, the research conducted by Erickson and Geist (2016) on Dynamic Learning Maps (DLM) indicates that DLM can inform the development of alternate assessments for children with significant cognitive disabilities. Their findings suggest that DLM not only enhances educational support but also necessitates ongoing evaluation to ensure effectiveness across diverse educational settings. This aligns with previously discussed theoretical frameworks advocating for assessments tailored to the unique profiles of children with disabilities and aligned with instructional goals (Rebello et al., 2011; Kessel et al., 2019).

Table 2. Summary of Studies on Technology-Based Cognitive Assessment and Intervention for Children with Special Needs

Authors	Technology implementation	Targeted Disabilities	Description of Implementation	Efficacy
Esposito et al. (2017)	Tablet Applications	Autism Spectrum Disorder (ASD)	Showed higher progress in cognitive skills compared to control group.	Differences did not reach significance level; requires further research for broader applicability.
Munoz et al. (2018)	Digital Game Programming Workshop	Autism Spectrum Disorder (ASD)	Participants acquired high-level computational thinking skills; positive engagement noted.	Requires access to technology and may not be generalizable to all ASD populations.
Erickson & Geist (2011)	Dynamic Learning Maps (DLM)	Significant Cognitive Disabilities	Informed development of alternate assessments; improved educational support.	Requires ongoing evaluation for effectiveness across diverse educational settings.

Table 2 provides a summary of studies on technology-based cognitive assessment for children with special needs, highlighting the diverse methodologies employed and their respective efficacies. The studies included in this table represent a range of technological implementations, from tablet applications to game-based assessments, showcasing the breadth of innovation in this field. For instance, the study by Munoz et al. (2018) exemplifies how collaborative programming activities can enhance cognitive skills while promoting engagement, a theme that resonates throughout the literature on technology-based assessments.

The findings from these studies collectively suggest that technological advancements in cognitive assessment not only provide innovative ways to evaluate cognitive abilities but also actively engage children in their learning processes. This is particularly relevant in the context of children with special needs, who often benefit from interactive and adaptive learning environments. The integration of technology facilitates a more comprehensive understanding of a child's cognitive capabilities, moving beyond traditional assessment methods that may not fully capture their potential. In conclusion, the advancement of cognitive assessment through technological innovations

presents a significant opportunity to enhance educational outcomes for children with special needs. The studies ighlight the efficacy of various technology-based assessment tools, emphasizing the need for continued research and development to ensure these tools are accessible and effective for diverse populations.

Theme 3: Cognitive Assessment Element

Cognitive assessment for children with special needs is paramount in identifying individual learning requirements and tailoring educational interventions. The studies summarized in Table 3 reveal two primary groups of cognitive assessment elements: performance and participation skills, and cognitive function. Each group encompasses various assessment techniques that highlight distinct cognitive capabilities essential for children with special needs (table 3).

Table 3. Summary of Studies on Element of Cognitive Assessment for Children with Special Needs

Elements Group	Authors	Assessment Technique	Cognitive Assessment Elements
Performances and Participation Element	Egilson & Coster, (2004)	School Function Assessment (SFA)	Participation; performance.
	Zaino et al. (2025)	Motor Intelligence Assessment Tool	Sensory-motor coordination; balance; motor planning; movement prioritization.
	Munoz et al. (2018)	Assessment based on Game Building Workshop	Collaboration
	Reesman et al. (2014)	Review of Assessment Measures	Accommodations for communication; interpretation.
	Erickson & Geist (2011)	Dynamic Learning Maps (DLM)	Motor; sensory; language; reading; writing skills; communication abilities.
	Esposito et al. (2017)	Assessment through Tablet Applications	Attention; vocabulary; imitation skills
	Nusser & Weinert (2024)	Intensified Test Instructions	Simplified instructions; physical activity engagement; attention enhancement.
Cognitive function	Rzhanova et al. (2025)	Kaufman Assessment Battery for Children (KABC-II), WISC-V	Fluid intelligence; working memory; processing speed; visual-spatial abilities; verbal abilities.
	Hajovsky et al. (2018)	Kaufman Assessment Battery for Children, Kaufman Tests of Educational Achievement	Learning Efficiency; Short-Term Memory; Retrieval Fluency; Crystallized Ability.
	Simonoff et al. (2020)	Latent growth curve models	IQ; Social Responsiveness Scale

Elements Group	Authors	Assessment Technique	Cognitive Assessment Elements
	Munoz et al. (2018)	Assessment based on Game Building Workshop	problem-solving; creativity; and computational concepts.
	Carrasumada et al. (2006)	Experimental Tests on Counting Processes	One-to-one correspondence; stable order; cardinality; abstraction; order irrelevance.

The first group, focusing on performance and participation elements, includes studies that evaluate participation, sensory-motor coordination, and engagement in educational activities. For instance, the School Function Assessment (SFA) by Egilson and Coster (2004) evaluates participation and performance among Icelandic students with special needs. Their findings indicate that children face significant challenges in school settings, underscoring the necessity for tailored educational environments that support their learning needs. This aligns with the theoretical framework advocating for assessments that are aligned with instructional goals and tailored to the unique profiles of children with disabilities (Rebello et al., 2011; Kessel et al., 2019). Similarly, the study by Zaino et al. (2025) on the Motor Intelligence Assessment Tool emphasizes sensory-motor coordination and balance in children with intellectual disabilities. The tool's adaptation and validation demonstrate its effectiveness in identifying sensory-motor deficits, highlighting the need for continuous refinement of assessment tools to ensure their relevance and efficacy. This is crucial for developing individualized education plans (IEPs) that cater to the specific needs of children with disabilities (Zaheer et al., 2023; Park et al., 2023). Moreover, Nusser and Weinert (2017) further contribute to this discussion by exploring intensified test instructions designed to enhance comprehension and engagement among children with special needs. Their research indicates that simplified instructions and physical activity can significantly improve attention and performance during assessments. This highlights the necessity for adaptive assessment techniques that consider individual learning styles and cognitive profiles.

The second group is focusing on cognitive function which is includes studies that assess problem-solving, creativity, and other advanced cognitive functions. Munoz et al. (2018) illustrate the effectiveness of a game-building workshop in developing computational thinking skills among adolescents with Autism Spectrum Disorder (ASD). Participants in this study not only acquired high-level skills but also displayed increased engagement and motivation throughout the learning process. This approach aligns with the principles of IEPs, which emphasize personalized learning pathways tailored to individual strengths and weaknesses (Zaheer et al., 2023; Park et al., 2023). Rzhanova et al. (2025) conducted research utilizing the Kaufman Assessment Battery for Children (KABC-II) and WISC-V to evaluate fluid intelligence and other cognitive abilities in children with learning disabilities. Their findings underscore the importance of assessing a range of cognitive functions, including working memory and processing speed, to gain a comprehensive understanding of a child's cognitive profile. This aligns with the theoretical frameworks discussed previously, which advocate for assessments that are tailored to the unique profiles of children with disabilities and aligned with instructional goals (Rebello et al., 2011; Kessel et al., 2019). Hajovsky et al. (2018) also contribute valuable insights into cognitive assessment by examining the influences of cognitive ability on written expression. Their findings suggest developmental and sex-based differences in school-age children, emphasizing the need for assessments that consider these variables

to provide a more accurate reflection of a child's capabilities. This highlights the importance of individualized assessments that account for diverse cognitive profiles and learning needs. Finally, the study conducted by Carrasumada et al. (2006) through experimental tests on counting processes. The study emphasized several cognitive elements such as one-to-one correspondence and cardinality. Their findings reveal significant differences in counting principles between children with special needs and their typically developing peers, emphasizing the importance of targeted interventions to enhance foundational cognitive skills. This aligns with the broader goal of using cognitive assessments to inform educational strategies that foster growth and development.

In reviewing the findings from these studies, it becomes evident that various cognitive assessment methods yield distinct advantages. The integration of both performance and cognitive function assessments provides a holistic view of a child's abilities, allowing educators to develop tailored interventions that address specific learning challenges. This is particularly relevant for children with special needs, who often benefit from assessments that not only evaluate cognitive functioning but also foster areas of potential growth. The implications of these findings extend beyond the individual assessments themselves. They underscore the necessity for ongoing evaluation and adaptation of assessment tools to ensure they remain effective across diverse educational settings. As highlighted by Erickson and Geist (2016), the Dynamic Learning Maps (DLM) framework informs the development of alternate assessments for children with significant cognitive disabilities, emphasizing the importance of continuous assessment to enhance educational support.

Theme 4: Gaps in cognitive Assessment for children with Special need

The assessment of cognitive abilities in children with special needs is critical for identifying their unique learning requirements and developing effective educational interventions. However, significant gaps in existing cognitive assessment methodologies hinder the ability to accurately evaluate and support these children. One notable gap is the lack of adaptation in school settings for diverse needs. Egilson & Coster (2004) highlighted that many educational environments do not adequately accommodate the varying requirements of students with special needs, which can lead to barriers in their learning and participation. This underscores the necessity for educational institutions to create inclusive environments that are responsive to the diverse profiles of children with disabilities, aligning with the principles of individualized education plans (IEPs) that emphasize tailored educational strategies (Zaheer et al., 2023).

The other significant gap is the insufficient reliability of assessments for motor intelligence in children with intellectual disabilities. Zaino et al. (2025) pointed out that existing tools often fail to measure motor intelligence accurately, which is crucial for understanding the cognitive functioning of this population. The development and validation of more reliable assessment tools are essential to ensure that children receive appropriate interventions based on accurate evaluations. The review by Reesman et al. (2014) further emphasizes the limited guidance available for assessing children who are deaf or hard of hearing. The authors noted that current assessment measures often lack necessary accommodations, which can lead to misdiagnosis and inadequate support. This gap highlights the urgent need for research focused on developing effective assessment strategies that are culturally

and contextually appropriate for this population. Additionally, Erickson & Geist (2016) pointed out the lack of comprehensive on students with significant cognitive disabilities and complex communication needs. Without sufficient data and information, it becomes challenging to inform the development of alternate assessments tailored to their specific needs. This gap calls for extensive research to gather data that can guide the creation of effective assessment tools and strategies for these students.

The involvement of adolescents with intellectual disabilities in the adaptation of self-reported subjective well-being measures presents another area of concern. Davison et al. (2022) identified cognitive and linguistic barriers that complicate the measurement of subjective well-being, suggesting that existing measures may not adequately capture the experiences of these adolescents. This gap necessitates the development of more accessible assessment measures that can accurately reflect the subjective experiences of young individuals with intellectual disabilities. Moreover, Aljunied & Frederickson (2011) highlighted the need for clearer indicators to assess varying levels of educational support in autism. Their research indicates that current assessment measures may not sufficiently differentiate between the levels of support required by children with autism, which can result in misalignment between assessment results and educational interventions. This gap emphasizes the importance of developing nuanced assessment tools that can effectively identify the specific support needs of children with autism spectrum disorder (ASD).

Another significant gap pertains to the limitations of static assessments, as noted by Bosma and Resing (2006). Their study on dynamic assessment revealed that traditional assessments fail to capture dynamic cognitive performances, which are critical for understanding a child's true cognitive potential. This finding underscores the need for incorporating dynamic assessment methods that provide a more comprehensive view of a child's cognitive abilities and learning potential. Finally, Rzhanova et al. (2025) pointed out the lack of comprehensive tools for assessing fluid intelligence in children with learning disabilities. Their research highlights the need for assessments that can accurately measure fluid intelligence, which is essential for understanding cognitive functioning and guiding educational interventions. This gap calls for the development of innovative assessment tools that can provide insights into the cognitive profiles of children with learning disabilities.

Figure 2. Gaps and Challenge of Cognitive Assessment for Children with Special Need

In summary, the gaps and challenges in implementing cognitive assessments for children with special needs are multifaceted, encompassing issues related to the adaptation of educational environments, the reliability and specificity of assessment tools, the availability of comprehensive data, and the need for innovative assessment methodologies (see Figure 2). Addressing these gaps is crucial for improving the accuracy and effectiveness of cognitive assessments, ultimately enhancing educational outcomes for children with special needs.

Conclusion

This systematic literature review has shed light on the critical importance of cognitive assessment for children with special needs, revealing significant findings across four key themes: innovative approaches, advancements in technology, cognitive assessment elements, and existing gaps in assessment practices. The research highlights that traditional assessment methods often fail to accommodate the diverse cognitive profiles of these children, leading to potential misdiagnosis and ineffective educational interventions. One of the primary findings is the efficacy of innovative approaches, such as game-based assessments and dynamic learning maps, which actively engage children and promote their cognitive development. These methods not only assess cognitive abilities but also enhance motivation and learning outcomes, aligning with the principles of individualized education plans (IEPs) that emphasize tailored educational strategies. Furthermore, the integration of technology, such as tablet applications, has shown promise in improving cognitive and social skills among children with Autism Spectrum Disorder (ASD). However, the review also identifies critical gaps in current assessment practices, including the lack of standardized tools specifically designed for diverse populations and insufficient reliability in existing assessments for motor intelligence. These gaps highlight the urgent need for ongoing research to develop more effective, culturally responsive assessment tools that can accurately reflect the cognitive abilities of children with special needs.

Recommendations

This research contributes to the existing body of knowledge by synthesizing empirical studies and identifying effective cognitive assessment methodologies tailored to children with special needs. Future research should focus on the continuous refinement of assessment practices, particularly those that leverage technology and address the unique challenges faced by diverse populations. Addressing this challenge, educators and practitioners can enhance the educational experiences and outcomes for all children with special needs.

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