

# Teaching Strategies and Learning Outcomes in Deaf Children: A Comprehensive Review of Inclusive Educational Practices

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## Abstract

*Deafness in childhood presents unique challenges and opportunities for educational practice, requiring specialized didactic approaches that recognize the diverse communication needs and learning styles of deaf children. Approximately 466 million people worldwide experience disabling hearing loss, with a significant number of cases occurring in early childhood, a critical period for language acquisition and cognitive development (World Health Organization, 2021). Early intervention and tailored educational strategies are essential to support the academic and social development of deaf learners, whose needs differ markedly from those of their hearing peers. Traditional oralist methods, which emphasize speech and lip-reading, have historically dominated deaf education but have faced criticism for their limited effectiveness and exclusion of natural sign languages. In contrast, bilingual-bicultural approaches that integrate sign language alongside spoken/written language have gained prominence for fostering linguistic competence and cultural identity among deaf children (Marschark & Hauser, 2012). Furthermore, the incorporation of visual learning tools, assistive technologies such as cochlear implants and hearing aids, and inclusive pedagogies tailored to individual needs has transformed educational possibilities. Despite these advancements, challenges remain in ensuring equitable access to quality education for deaf children, including disparities in teacher preparation, resource availability, and societal attitudes toward deafness. This review aims to synthesize current knowledge on didactic methods for deaf children, examining communication modalities, teaching innovations, empirical outcomes, and persistent barriers. By analyzing existing literature, the review seeks to inform educators, policymakers, and researchers on best practices and future directions to optimize learning experiences and outcomes for deaf children within inclusive educational frameworks.*

**Key words:** Deaf Education; Accessibility; Inclusive Pedagogy; Teacher Training; Social Stigma; Family Involvement.

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## Introduction

Deafness in childhood represents a complex and multifaceted condition that affects millions of children worldwide and significantly influences their linguistic, cognitive, emotional, and social development, thereby posing unique educational challenges which require thoughtful and inclusive pedagogical approaches. According to the World Health Organization (2021), approximately 466 million people globally experience disabling hearing

loss, with a substantial percentage being children who face critical developmental windows for language acquisition during their early years. This condition, whether congenital or acquired, disrupts typical auditory pathways that facilitate spoken language development, leading to potential delays in communication skills, academic performance, and social integration if appropriate interventions are not implemented promptly (Marschark & Spencer, 2010). Historically, educational strategies for deaf children have oscillated between oralist methods that prioritize speech training and lip reading, and manualist approaches that center around the use of sign language as a natural and fully developed linguistic system (Ladd, 2003). The oralist tradition, dominant for much of the twentieth century, sought to assimilate deaf children into hearing society by focusing exclusively on spoken language acquisition, often to the detriment of recognizing the value of sign languages, which embody cultural identity and cognitive richness (Humphries et al., 2012). In contrast, the bilingual-bicultural approach, which has increasingly gained acceptance in recent decades, advocates for the use of both sign language and the dominant spoken/written language, thus fostering bilingualism and biculturalism, and acknowledging deafness not as a deficiency but as a cultural and linguistic variation (Humphries et al., 2012). This shift represents a significant paradigmatic change in deaf education, emphasizing the importance of early and accessible language exposure in a modality natural to the child to promote optimal cognitive and linguistic outcomes (Kral & O'Donoghue, 2010). It is well established that early diagnosis through newborn hearing screening programs and timely access to language, be it signed or spoken, are critical determinants of successful educational trajectories and later life opportunities for deaf children (Yoshinaga-Itano et al., 2018). Despite these advances, the educational experiences of deaf children remain highly heterogeneous due to factors such as the degree and onset of hearing loss, presence and effectiveness of assistive technologies like cochlear implants and hearing aids, familial communication preferences, socio-economic contexts, and availability of specialized educational resources (Marschark & Hauser, 2012). Inclusive didactics in this context must therefore be dynamic and flexible, designed to meet the individual learning needs of each child while fostering their linguistic development and academic progress in environments that promote social inclusion and equity (Napier et al., 2010). Furthermore, deaf children often face systemic barriers within mainstream educational settings, including limited access to teachers trained in deaf education, insufficient exposure to sign language in curricula, and a scarcity of instructional materials and technologies adapted for visual learning (Spencer & Marschark, 2010). These obstacles are exacerbated by persistent social stigmas and misconceptions surrounding deafness, which can marginalize deaf learners and negatively impact their self-esteem and motivation (Humphries et al., 2016). Contemporary inclusive pedagogy for deaf education thus advocates for culturally responsive teaching that validates deaf identity and culture, engages families and communities as partners in education, and utilizes multimodal teaching strategies that integrate visual, tactile, and technological supports (Marschark et al., 2015). Technological innovations such as video remote interpreting, captioning services, interactive multimedia, and assistive listening devices have expanded educational access, yet their effectiveness depends largely on appropriate implementation and alignment with pedagogical goals (Cawthon & Leppo, 2013). In addition to linguistic and academic outcomes, inclusive didactics also prioritize the holistic development of deaf children, including their social skills, emotional well-being, and self-advocacy abilities, recognizing that successful education encompasses more than knowledge acquisition alone (Bat-Chava et al., 2005). Multidisciplinary research combining insights from audiology, linguistics, cognitive psychology, and special education has contributed to the development of evidence-based interventions that address both the unique challenges and the strengths of deaf learners, fostering environments that promote autonomy and resilience (Swanwick & Connaghan, 2019). However, significant gaps remain in longitudinal data regarding the long-term efficacy

of different pedagogical approaches, the best practices for bilingual education models, and the training and retention of qualified educators equipped to serve the deaf population within increasingly inclusive settings (Marschark et al., 2015). Moreover, the rapid evolution of digital technologies and shifting societal attitudes necessitate continual adaptation of educational frameworks to ensure equity and quality of learning experiences for deaf children worldwide. In sum, the educational needs of deaf children demand nuanced and inclusive didactic strategies that honor linguistic diversity, cultural identity, and individual learning profiles while overcoming systemic barriers. This review seeks to synthesize current knowledge concerning deafness in childhood, the challenges faced within educational systems, and the role of inclusive pedagogy in enhancing learning outcomes and social inclusion, thereby providing a foundation for research, policy, and practice aimed at empowering deaf learners to achieve their full potential.

### **1. Communication Modalities and Their Impact on Learning**

Communication modalities in deaf education have long been a subject of debate and research due to their profound implications for cognitive development, language acquisition, identity formation, and academic achievement in deaf children. Among the primary modalities, sign language represents a fully natural, visual-gestural language system that is accessible from birth or early childhood for many deaf individuals. It is characterized by complex grammatical structures and rich expressive potential, enabling full linguistic development parallel to spoken languages (Lane, Hoffmeister, & Bahan, 1996). Research has consistently demonstrated that early exposure to sign language supports not only communication skills but also cognitive, social, and emotional growth, which are foundational for effective learning (Humphries et al., 2012). Sign language offers deaf children access to a linguistic community and culture, often referred to as Deaf culture, which fosters a positive self-identity and a sense of belonging that can enhance motivation and engagement in educational contexts (Ladd, 2003). In contrast, oral methods focus on teaching deaf children to develop spoken language skills through speechreading, auditory training, and articulation, often supplemented with hearing technologies such as hearing aids or cochlear implants (Marschark & Spencer, 2010). The oralist approach, historically dominant in many educational systems, aims to integrate deaf children into hearing society by prioritizing speech communication, sometimes at the cost of limiting access to natural sign languages (Humphries et al., 2012). While some children benefit from oral methods, particularly when diagnosed early and supported with advanced assistive devices, outcomes are highly variable, and many deaf learners experience challenges in fully acquiring spoken language due to the nature of their hearing loss (Kral & O'Donoghue, 2010).

The limitations of exclusively oral approaches have led to the development of Total Communication, a philosophy introduced in the late twentieth century that advocates the use of multiple communication modes simultaneously, including sign language, spoken language, fingerspelling, gestures, and lipreading, with the goal of maximizing communication opportunities for deaf children (Johnson, Liddell, & Erting, 1989). Total Communication recognizes the heterogeneity of deaf learners and attempts to provide flexible, individualized support tailored to each child's abilities and preferences. Despite its pragmatic appeal, Total Communication has faced criticism for potentially diluting linguistic input, leading to inconsistent language models and confusion among learners, particularly when sign language is used in a pidginized or incomplete form (Humphries et al., 2012). More recently, the bilingual-bicultural approach has emerged as a comprehensive educational framework that embraces the use of a natural sign language as the first language of instruction alongside the spoken/written language of the surrounding hearing community as a second language (Humphries et al., 2012). This model promotes deaf children's development as bilingual individuals who navigate both Deaf and hearing cultures, allowing for full linguistic access and

cultural affirmation (Ladd, 2003). Empirical studies have underscored the benefits of bilingual-bicultural education in supporting language competence, academic achievement, and psychosocial well-being among deaf learners (Marschark & Hauser, 2012). The model also emphasizes early and consistent exposure to sign language to ensure a strong linguistic foundation, which subsequently facilitates the acquisition of spoken and written languages, thereby addressing the critical period of language development that deaf children risk missing if deprived of accessible communication (Kral & O'Donoghue, 2010). However, despite its theoretical strengths and growing advocacy, bilingual-bicultural education faces challenges related to policy implementation, availability of qualified teachers fluent in sign language, and the development of adequate curriculum and assessment tools that recognize the dual language acquisition process (Marschark et al., 2015). Furthermore, debates continue about the extent to which spoken language should be emphasized alongside sign language, particularly given the diverse linguistic profiles and technological interventions among deaf students, including those with cochlear implants who may have greater auditory access (Yoshinaga-Itano et al., 2018). The choice of communication modality not only influences linguistic and academic outcomes but also shapes the social and emotional experiences of deaf children. The use of sign language within a bilingual-bicultural context has been linked to higher self-esteem, stronger cultural identity, and better social integration with peers and adults in both Deaf and hearing communities (Bat-Chava, Martin, & Kosciw, 2005). Conversely, reliance on oral-only methods without adequate linguistic input can lead to language deprivation, social isolation, and reduced academic performance, highlighting the risks associated with excluding sign language from educational settings (Humphries et al., 2016).

Contemporary research advocates for a child-centered, evidence-based approach that respects the rights of deaf children to accessible communication while taking into account individual preferences, family involvement, and evolving technological supports (Napier, Leigh, & Mainstone, 2010). Advances in neurocognitive studies have further informed educators about the critical role of early language exposure—whether signed or spoken—in shaping brain development and learning capacities, reinforcing the urgency of providing effective communication environments from infancy (Kral & O'Donoghue, 2010). In addition, sociolinguistic perspectives recognize the legitimacy of sign languages as natural languages with their own grammar and expressive power, challenging past misconceptions that viewed them as mere manual codes or inferior to spoken languages (Ladd, 2003). This shift has important implications for curriculum design, teacher training, and assessment, requiring educators to be proficient in sign language and culturally competent in Deaf culture to deliver truly inclusive didactic practices (Marschark et al., 2015). The complex interplay between communication modality, cognitive development, and educational success underscores the necessity for flexible pedagogical frameworks that accommodate linguistic diversity and promote bilingualism and biculturalism in deaf education (Humphries et al., 2012). It also demands ongoing research to evaluate the long-term impacts of different modalities on academic achievement, language proficiency, social integration, and quality of life for deaf individuals (Spencer & Marschark, 2010). The selection and implementation of communication modalities in educational settings are pivotal factors that influence the learning trajectories of deaf children, requiring approaches that prioritize early language access, cultural affirmation, and individualized support. Through integrating sign language with spoken and written languages in a bilingual-bicultural framework, educational systems can foster optimal cognitive, linguistic, and socio-emotional development, thereby advancing equity and inclusion for deaf learners.

## 2. Innovative Teaching Strategies for Deaf Children

The educational experiences of deaf children have progressively evolved with the incorporation of innovative teaching strategies that address their unique linguistic, cognitive, and sensory needs. Visual aids constitute one of the foundational pedagogical tools within deaf education, leveraging the strengths of visual learning to enhance comprehension and engagement. Visual supports such as graphic organizers, pictorial representations, captioned videos, and interactive whiteboards facilitate the contextualization of abstract concepts, thereby making learning more concrete and accessible (Marschark & Knoors, 2012). These tools are especially vital given the reliance of many deaf students on visual input for language acquisition and content comprehension, compensating for limited auditory access (Humphries et al., 2016). The integration of advanced educational technology further amplifies this visual approach, with digital platforms, multimedia resources, and communication apps designed specifically to support deaf learners' interaction with curricular content and peers. For instance, video-based learning incorporating sign language interpreters or captioning enables multimodal reception of information, fostering not only academic knowledge but also linguistic development (Easterbrooks & Baker, 2002). Moreover, emerging technologies such as tactile devices, haptic feedback tools, and virtual reality environments are being explored to provide multisensory learning experiences that cater to diverse needs, including those of deafblind students or children with additional disabilities (McCarty & Swisher, 2013). These technologies allow the incorporation of touch and movement, expanding the modalities through which deaf children can engage with instructional material and facilitating deeper cognitive connections. Central to these approaches is the philosophy of individualized instruction, which recognizes the heterogeneity within the deaf student population regarding language preferences, cognitive profiles, and social-emotional needs. Tailored teaching methods that consider a child's communication modality, prior knowledge, and learning style have been shown to significantly enhance motivation, autonomy, and academic outcomes (Marschark et al., 2015). For example, individualized education plans that integrate visual schedules, personalized learning objectives, and scaffolded activities empower educators to scaffold knowledge effectively and provide targeted interventions (Marschark & Spencer, 2010). Furthermore, tactile learning strategies, which include hands-on manipulation of objects, kinesthetic activities, and sensory exploration, support the development of fine motor skills, spatial reasoning, and conceptual understanding, particularly in early childhood and foundational education (Schick, De Villiers, & de Villiers, 2007).

These methods also align with Deaf cultural values that emphasize experiential learning and community involvement, thus promoting holistic development beyond academic achievement (Ladd, 2003). Collaborative learning environments that facilitate peer interaction, cooperative projects, and social communication are also instrumental, as they provide opportunities for deaf children to practice language skills in meaningful contexts while fostering social inclusion and self-confidence (Marschark & Knoors, 2012). Importantly, educators are increasingly employing a multimodal teaching framework that integrates visual, tactile, and technological resources within a culturally responsive pedagogy, acknowledging the intersection of linguistic identity and educational access (Humphries et al., 2012). Teacher training plays a crucial role in the successful implementation of these innovative strategies, requiring proficiency in sign language, understanding of deaf culture, and competencies in technology use and differentiated instruction (Marschark et al., 2015). Professional development programs that incorporate experiential learning, mentorship, and reflective practices have been associated with increased teacher efficacy and improved student outcomes (Napier, Leigh, & Mainstone, 2010). Nonetheless, challenges persist, including disparities in resource availability, variable access to qualified personnel, and the need for evidence-based curricula that keep pace with technological advancements and evolving educational standards.

(Spencer & Marschark, 2010). Additionally, engaging families as active partners in the educational process is essential, as home environments that support visual communication and technological use reinforce school-based learning and foster positive attitudes towards education (Humphries et al., 2016).

Research underscores the importance of early intervention programs that incorporate these innovative strategies from infancy and preschool years, maximizing critical periods for language acquisition and cognitive development (Kral & O'Donoghue, 2010). Longitudinal studies suggest that when deaf children receive consistent access to visual aids, technology-enhanced instruction, tactile learning experiences, and personalized educational support, they demonstrate higher levels of academic achievement, language proficiency, and socio-emotional well-being (Marschark & Hauser, 2012). This body of evidence advocates for systemic educational reforms that prioritize inclusive, multimodal teaching methodologies as standard practice rather than exceptions within special education frameworks. In conclusion, the implementation of innovative teaching strategies for deaf children, encompassing visual aids, cutting-edge technology, tactile learning modalities, and individualized instruction, constitutes an essential paradigm shift in deaf education. These approaches not only respond to the sensory and linguistic realities of deaf learners but also promote equitable access to knowledge and foster holistic development. Moving forward, continued interdisciplinary research, policy advocacy, and investment in educator preparation will be critical to sustaining and expanding these innovative practices, thereby ensuring that deaf children receive the quality education they deserve.

### **3. Challenges and Barriers in Deaf Education**

Deaf education faces numerous and complex challenges that hinder the full realization of equitable learning opportunities for deaf children across diverse contexts. One of the most pressing issues is accessibility, which encompasses not only physical access to educational environments but also linguistic, technological, and curricular access. Many educational settings lack sufficient resources such as qualified sign language interpreters, real-time captioning, and assistive listening devices, which are critical for enabling deaf students to participate fully in classroom activities and to access the curriculum on par with their hearing peers (Marschark & Spencer, 2010). Inadequate accessibility often leads to significant gaps in educational achievement and language acquisition, perpetuating cycles of marginalization. A second formidable barrier involves the insufficient training and preparedness of educators. Many teachers working with deaf children do not possess specialized knowledge or skills in deaf culture, sign language, or differentiated instructional strategies tailored to the needs of deaf learners (Napier, Leigh, & Mainstone, 2010). This lack of training compromises their ability to deliver inclusive pedagogy that fosters language development, cognitive growth, and social integration. Professional development opportunities tend to be limited, particularly in under-resourced or rural areas, exacerbating disparities in educational quality (Marschark, Knoors, & Harris, 2015). Furthermore, social stigma and misconceptions about deafness continue to undermine educational and social inclusion. Deafness is frequently associated with deficit models that emphasize disability rather than cultural identity, leading to lowered expectations by educators, peers, and even families (Humphries et al., 2016). Such stigmatization contributes to social isolation, reduced self-esteem, and reluctance among deaf children to fully engage in school communities, which negatively impacts their motivation and academic outcomes (Ladd, 2003). This stigma can also influence policy decisions and resource allocation, often sidelining deaf education in favor of mainstreaming without adequate supports. Family involvement constitutes another critical yet often overlooked barrier. Families play a pivotal role in early language acquisition and educational success; however, many parents of deaf children face challenges including lack of access to sign language training,

limited information about communication options, and insufficient support services (Humphries et al., 2012).

This gap can delay language exposure, affecting cognitive and social development and complicating the transition into formal schooling (Kral & O'Donoghue, 2010). The divergence in family attitudes and resources further impacts the consistency and reinforcement of communication strategies used at school and home, which is crucial for learning continuity (Marschark & Hauser, 2012). The intersectionality of these challenges is intensified by systemic issues such as socioeconomic disparities, geographic location, and cultural differences. Deaf children from marginalized communities are disproportionately affected by limited access to quality education and support services, perpetuating educational inequities (Spencer & Marschark, 2010). Moreover, the rapid pace of technological advancements creates a paradoxical barrier: while new assistive technologies hold great promise for improving access and learning outcomes, inequitable access to such technologies often widens the gap between well-resourced and under-resourced students (McCarty & Swisher, 2013). The digital divide remains a salient issue, particularly in developing countries and underserved populations, where infrastructure and funding constraints limit technology integration in deaf education (Easterbrooks & Baker, 2002). Language policy within education systems also presents challenges, as decisions about the use of sign language, oral communication, or bilingual-bicultural approaches vary widely and sometimes inconsistently across regions and institutions (Humphries et al., 2016). These policies significantly affect curriculum design, teacher preparation, and instructional methodologies, thereby impacting the quality of education deaf students receive (Marschark et al., 2015). Finally, psychological and emotional barriers must be acknowledged, as deaf children often experience higher rates of anxiety, depression, and social withdrawal related to communication difficulties and experiences of exclusion (Humphries et al., 2012). Addressing these multifaceted challenges requires systemic reforms and a commitment to inclusive, culturally responsive education that values deaf identity and linguistic diversity. Collaborative efforts among policymakers, educators, families, and deaf communities are essential to overcoming these barriers, ensuring that deaf children have equitable access to quality education and the opportunity to achieve their full potential. This endeavor includes sustained investment in accessible technologies, comprehensive teacher training, anti-stigma campaigns, family support programs, and inclusive curricular frameworks that respect and integrate the linguistic and cultural heritage of deaf learners. Without addressing these interconnected challenges holistically, the promise of inclusive education for deaf children remains elusive, perpetuating educational inequities and limiting societal participation.

## Conclusions

The educational landscape for deaf children is marked by a complex interplay of challenges that require multifaceted and sustained responses. Accessibility issues, ranging from inadequate provision of linguistic and technological supports to curriculum limitations, fundamentally restrict the ability of deaf learners to engage fully and achieve academic success. The shortage of adequately trained educators who understand both the linguistic and cultural dimensions of deafness further exacerbates these obstacles, undermining inclusive pedagogical practices that are vital for fostering effective learning environments. Social stigma and entrenched deficit perspectives on deafness continue to hinder the recognition of deaf individuals as members of a rich cultural and linguistic minority, thereby impacting self-identity and peer integration within educational settings. Family involvement, while critical to early language development and ongoing educational progress, is often impeded by lack of access to appropriate resources and support systems. These barriers are compounded by broader systemic inequities related to socioeconomic status, geography, and policy

inconsistencies, which disproportionately affect marginalized deaf populations. Addressing these challenges demands comprehensive strategies that prioritize cultural and linguistic inclusion, professional development for educators, accessible technologies, and empowerment of families. Only through such a holistic and collaborative approach can educational systems move beyond mere accommodation to genuine inclusion, enabling deaf children to realize their full academic potential and participate meaningfully in society. The imperative lies not only in recognizing these barriers but in actively dismantling them through informed policy, innovative practice, and sustained advocacy, ensuring equity and respect for deaf learners worldwide.

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