

Inclusive Education and Academic Achievement of Students with Visual Impairment: Challenges, Opportunities, and Evidence-Based Practices

¹Dheeraj Kumar Nagar, ²Mr. Hasan Deen Khan

¹Assistant Professor, Department of Special Education University of Technology, Watika, Jaipur, Rajasthan, India

Email: dhakardheeraj005@gmail.com

²Assistant Professor, Department of Special Education and Rehabilitation Science
University of Technology, Watika, Jaipur, Rajasthan, India

Email: hasankhan007860@gmail.com

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Abstract

Inclusive education has become a central policy goal in special education systems worldwide, yet its implementation for learners with visual impairment continues to raise questions about access, equity, and academic outcomes. This paper reviews the theoretical foundations, empirical literature, and practical realities associated with educating students with visual impairment in general education classrooms. It examines the barriers that limit meaningful participation, including inaccessible curricula, insufficient teacher preparation, limited availability of adapted materials, and attitudinal obstacles among peers and staff. It also considers the opportunities that inclusive settings offer for social integration, self-determination, and exposure to grade-level academic content. Drawing on evidence-based practices such as expanded core curriculum instruction, universal design for learning, collaborative teaching models, and structured orientation and mobility programming, the paper proposes a framework for improving academic achievement while preserving the disability-specific supports that learners with visual impairment require. The discussion concludes that inclusion is not merely physical placement but a set of conditions that must be deliberately engineered, resourced, and monitored if it is to translate into improved literacy, numeracy, and long-term postsecondary outcomes for this population.

Keywords: inclusive education, visual impairment, academic achievement, expanded core curriculum, special education, evidence-based practice

1. INTRODUCTION

Visual impairment, encompassing both blindness and low vision, affects a comparatively small but educationally significant proportion of the school-age population. Because vision underlies so much of incidental learning during early childhood, children who are blind or have low vision often arrive at school with different experiential foundations than their sighted peers, even when their cognitive capacities are unimpaired. Historically, education for this population occurred almost exclusively in residential or specialized schools, where trained staff, adapted materials, and low student-to-teacher ratios could be concentrated. The last several decades, however, have seen a marked global shift toward inclusive education, driven by human-rights frameworks, disability legislation, and a broader belief that segregated schooling limits social opportunity regardless of its instructional benefits. This shift has produced genuine gains in access but has also exposed significant gaps between the aspiration of inclusion and the resources needed to realize it. Students with visual impairment placed in general education classrooms frequently encounter print materials that have not been converted to Braille or large print in a timely manner, technology that is not compatible with screen-reading software, and teachers who have received little to no training in disability-specific pedagogy. At the same time, many students report that inclusive placement afforded them richer social networks, broader curricular exposure, and higher expectations than segregated settings historically provided. The tension between these two realities forms the central problem this paper addresses: how can inclusive education be structured so that the academic and social benefits it promises are not undermined by unaddressed access barriers. This paper synthesizes literature on the academic achievement of students with visual impairment in inclusive settings, organizes the challenges into curricular, instructional, technological, and attitudinal categories, and identifies practices with the strongest evidentiary support for improving outcomes. The purpose is not merely descriptive; it is to argue that

successful inclusion for this population requires the simultaneous presence of general education access and specialized, disability-specific instruction delivered through the expanded core curriculum

2. BACKGROUND AND SIGNIFICANCE

Visual impairment is a low-incidence disability, meaning that any given school or district is likely to serve only a handful of affected students at a time. This low incidence has practical consequences: districts often cannot justify hiring full-time teachers of students with visual impairment (TVIs) or orientation and mobility (O&M) specialists, and itinerant service models, in which a single specialist travels among several schools, have become the norm in many regions. While itinerant models extend limited specialist resources across a wider geographic area, they also constrain the amount of direct instructional time each student receives, often to an hour or two per week.

Academic achievement data for students with visual impairment are notoriously difficult to aggregate, partly because of low sample sizes and partly because standardized assessments are not always available in accessible formats. Nonetheless, the available research converges on the finding that this population, when properly supported, can achieve academic outcomes comparable to sighted peers, but that unsupported inclusion frequently results in gaps in reading fluency, mathematics achievement, and access to high-level coursework. The significance of this issue extends beyond childhood schooling: postsecondary and employment outcomes for adults who are blind or have low vision remain considerably worse than for the general population, and researchers have repeatedly linked these disparities to the quality of the K-12 educational experience, particularly the degree to which the expanded core curriculum was delivered alongside academic instruction.

3. Literature Review

3.1 Historical and Policy Context Inclusive education for students with visual impairment did not emerge from a single policy moment but accumulated through decades of legislative and philosophical change. Special education law in many countries progressively shifted the presumptive placement for students with disabilities toward the general education classroom, with removal to a more restrictive setting requiring specific justification. For students with visual impairment, this shift meant that residential schools, once the default option, increasingly became a placement of last resort or specialized choice, used primarily for students with additional disabilities or for concentrated instruction in disability-specific skills. International frameworks reinforced this trajectory by framing access to inclusive education as a matter of rights rather than charity, further accelerating the movement of students with visual impairment into neighbourhood schools.

3.2 Academic

Achievement Findings Research examining the academic achievement of included students with visual impairment presents a mixed but instructive picture. Several studies report that students with low vision or blindness who receive adequate accommodations achieve reading and mathematics scores within the average range for their sighted peers, particularly when Braille literacy or appropriate low-vision devices are introduced early and reinforced consistently. Other studies, however, document persistent gaps, especially in mathematics, where the sequential and often visually mediated nature of instruction (graphs, geometric figures, spatial reasoning tasks) poses accessibility challenges that are harder to resolve through simple text conversion. Reading achievement literature similarly shows that early, intensive Braille instruction is strongly associated with later literacy outcomes, while delayed or inconsistent introduction of Braille correlates with weaker outcomes, a pattern that has led some scholars to describe a "Braille literacy crisis" in cases where itinerant service models under-prioritize print-code instruction in favor of verbal accommodation.

3.3 Curriculum

Access and the Expanded Core Curriculum A recurring theme in the literature is the distinction between the general academic curriculum and the expanded core curriculum (ECC), a set of nine disability-specific skill domains including compensatory access skills (such as Braille and assistive technology), orientation and mobility, social interaction skills, independent living skills, recreation and leisure skills, career education, use of assistive technology, sensory efficiency, and self-determination. Scholars argue that academic achievement in the general curriculum cannot be fully realized without parallel instruction in the ECC, because skills such as efficient Braille reading, tactile graphic interpretation, and independent travel are prerequisite to full participation in academic tasks. Survey research consistently finds that ECC instruction time is inadequate in many inclusive placements, largely because itinerant teachers must divide limited hours between direct academic support and ECC instruction, often at the expense of the latter.

3.4 Teacher

Preparation and Attitudes Several studies examine the preparation of general education teachers to work with students with visual impairment, generally finding that pre-service teacher education programs devote minimal coursework to low-incidence disabilities. General education teachers frequently report feeling unprepared to adapt materials,

uncertain about how to collaborate effectively with itinerant specialists, and anxious about liability or safety concerns related to student mobility. Attitudinal research also suggests that low expectations, whether from teachers, peers, or family members, can constrain the opportunities extended to students with visual impairment, independent of the students' actual capabilities. Peer attitude studies indicate that structured contact and disability-awareness programming can improve peer acceptance, which in turn correlates with greater willingness among students with visual impairment to participate actively in classroom discourse.

3.5 Assistive

Technology and Material Accessibility Technological access constitutes a major and evolving area of the literature. Braille embossers, refreshable Braille displays, screen-reading software, and optical character recognition tools have expanded what is achievable in inclusive classrooms, but studies also document persistent gaps between the technology that exists and the technology that is actually available, funded, and maintained in individual schools. Timeliness of material conversion, converting textbooks, worksheets, and assessments into Braille, large print, or accessible electronic formats before they are needed in class, remains one of the most frequently cited practical barriers to full participation, with research documenting that materials often arrive weeks after their sighted peers have already used them.

3.6 Assessment

Accommodations and High-Stakes Testing A further strand of the literature addresses the accommodations provided during formal assessment, including classroom tests, standardized state or national examinations, and college-entrance testing. Researchers document considerable variability in how consistently accommodations such as Braille or large-print test booklets, extended time, and human readers or scribes are implemented across schools and testing jurisdictions, even when such accommodations are formally authorized in a student's individualized education plan. Timing issues are particularly salient in this literature: Braille versions of standardized tests often require substantially longer production lead times than print versions, and delays in test-form availability can result in students receiving accommodated materials later than their sighted peers, or in some documented cases, receiving accommodations that do not fully align with the format in which they were instructed. Because high-stakes assessment results are frequently used for grade promotion, course placement, and postsecondary admission decisions, inconsistencies in accommodation implementation carry consequences that extend well beyond a single test administration, reinforcing the argument that accessible assessment practices deserve the same systemic attention as accessible instructional materials.

4. CHALLENGES TO INCLUSIVE ACADEMIC ACHIEVEMENT

Several interconnected challenges emerge from the literature. First, resource scarcity related to low incidence means that specialist time, whether from TVIs or O&M instructors, is spread thin, limiting both academic support and ECC instruction. Second, curricular materials, particularly in mathematics and science, often rely on visual representations (charts, diagrams, laboratory demonstrations) that require substantial adaptation effort, and this adaptation is not always completed with sufficient lead time. Third, assessment practices frequently fail to provide accessible formats consistently, creating situations where a student's performance reflects access barriers rather than content mastery. Fourth, social and attitudinal factors, including low expectations and limited disability awareness among peers and staff, can constrain opportunities for full participation even when material access is adequate. Fifth, students with visual impairment and additional disabilities face compounded barriers, as many inclusive frameworks are designed primarily around single-disability accommodation models.

5. OPPORTUNITIES AFFORDED BY INCLUSIVE SETTINGS

Despite these challenges, the literature also documents genuine opportunities associated with inclusive placement. Exposure to grade-level curricula and a broader range of coursework, including advanced academic tracks not always available in specialized schools, can raise the ceiling of academic achievement for capable students. Social opportunities are frequently cited as a primary benefit, with inclusive settings offering exposure to a wider and more representative peer group, which can support the development of social skills necessary for later integration into mainstream workplaces and communities. Additionally, inclusive education can foster higher expectations among teachers and family members when supported by strong collaborative relationships between general educators and vision specialists, and when students themselves are equipped with self-advocacy skills through ECC instruction.

6. EVIDENCE-BASED PRACTICES

The literature identifies several practices with reasonably strong empirical or professional-consensus support for improving academic achievement in inclusive settings. Co-teaching and structured collaboration models, in which the TVI and general education teacher jointly plan lessons and share accountability for accommodations, are associated with more timely and higher-quality material adaptation than models relying solely on occasional itinerant consultation. Early and intensive Braille instruction, introduced before literacy demands increase in later grades, is

strongly linked to stronger long-term reading outcomes for students who are blind or have significant low vision. Universal Design for Learning (UDL) principles, which build multiple means of representation, expression, and engagement into lesson design from the outset, reduce the need for after-the-fact retrofitting of materials and often benefit the broader classroom, not only the student with visual impairment. Structured, sequential orientation and mobility instruction, delivered by certified specialists, supports independent navigation of the school environment, which in turn supports timely access to instruction rather than reliance on sighted guides. Finally, explicit self-determination and self-advocacy instruction, embedded within the ECC, equips students to communicate their own accommodation needs, a skill associated with better postsecondary and employment outcomes.

7. DISCUSSION

Taken together, the evidence suggests that inclusion, properly resourced, is neither inherently beneficial nor inherently harmful for the academic achievement of students with visual impairment; its effects depend heavily on implementation quality. Schools and districts that treat inclusion as a placement decision alone, without corresponding investment in specialist staffing, timely material conversion, and teacher preparation, risk academic and social outcomes worse than those achieved in well-resourced specialized settings. Conversely, schools that invest in collaborative teaching structures, early Braille literacy, accessible technology, and explicit ECC instruction can achieve both the academic breadth and the social integration that inclusion promises. Policy discussions should therefore move beyond a binary framing of inclusion versus segregation and instead focus on the specific conditions, staffing ratios, teacher training requirements, material conversion timelines, and curricular commitments, that determine whether inclusive placement translates into genuine access.

8. METHODOLOGICAL CONSIDERATIONS IN THE EXISTING EVIDENCE BASE

Any synthesis of research on students with visual impairment must contend with the methodological realities of studying a low-incidence population. Sample sizes in individual studies are typically small, ranging from single-digit case studies to cohorts of several dozen participants, which limits statistical power and makes generalization across age groups, degree of vision loss, and presence of additional disabilities difficult. Many studies rely on survey or interview methods with practitioners or family members rather than direct assessment of student outcomes, which provides valuable descriptive information about perceived barriers and practices but cannot establish causal relationships between specific interventions and academic gains. Longitudinal designs, which would be particularly valuable for tracking the relationship between early ECC instruction and later postsecondary outcomes, remain comparatively rare, and much of the available longitudinal evidence, such as large-scale Braille literacy cohort studies, addresses reading outcomes specifically rather than the full range of academic domains. Researchers in the field have repeatedly called for multi-site collaboration to pool sufficient sample sizes for more rigorous quantitative designs, as well as for the development of assessment instruments that are validated specifically for use with Braille readers and low-vision students rather than adapted from instruments normed on sighted populations.

9. LIMITATIONS

This review is subject to several limitations. First, it synthesizes a body of literature that is itself heterogeneous in methodology, population characteristics, and outcome measures, making direct comparison across studies imperfect. Second, the low-incidence nature of visual impairment means that findings from any individual study may not generalize well across the full range of etiologies, degrees of vision loss, and co-occurring conditions represented within the broader population of students with visual impairment. Third, much of the literature originates from higher-income countries with relatively well-developed specialist infrastructure, and caution should be exercised in extending these findings to educational systems with more limited specialist workforce or resource availability. Finally, because inclusive education policy and practice continue to evolve, some of the practical barriers described in older studies may have been partially addressed by subsequent technological or policy developments, even as new barriers, such as the accessibility of emerging digital curricular tools, continue to emerge.

10. DIRECTIONS FOR FUTURE RESEARCH

Several directions for future research follow directly from the gaps identified above. Longitudinal, multi-site studies that track students with visual impairment from early childhood through postsecondary transition would help clarify which specific combinations of academic and ECC instruction most strongly predict long-term success. Comparative studies examining the relative contribution of placement type versus specific instructional supports, rather than treating inclusion and segregation as a simple binary, would help refine placement decision-making frameworks. Additional research is also needed on students with visual impairment who have co-occurring disabilities, a subgroup that is frequently underrepresented in the existing literature despite facing some of the most significant access barriers. Finally, as curricular materials increasingly move to digital and interactive formats, ongoing research will be needed to evaluate whether new digital curricula maintain or erode the accessibility gains achieved with earlier, simpler print-based materials.

11. IMPLICATIONS FOR POLICY AND PRACTICE

The evidence reviewed in this paper carries several implications for policymakers, school administrators, and practitioners responsible for designing inclusive programming for students with visual impairment. At the policy level, funding formulas for low-incidence disabilities should recognize that itinerant service models, while cost-efficient at the system level, can under-deliver direct instructional time relative to what individual students need, particularly for ECC domains that are easily deprioritized when specialist time is scarce. Policymakers should also consider mandating minimum timelines for the conversion of curricular materials into accessible formats, since delayed access to Braille, large print, or accessible electronic textbooks has been repeatedly identified as a concrete and remediable barrier to equal participation. At the school level, administrators can support inclusion by building structured collaboration time into master schedules so that general education teachers and teachers of students with visual impairment can co-plan rather than relying on brief, informal exchanges. Teacher preparation programs, both pre-service and in-service, should expand coverage of low-incidence disabilities beyond a single survey course, given that general education teachers report persistent discomfort and uncertainty about their role in supporting students with visual impairment. At the classroom level, practitioners can prioritize Universal Design for Learning principles from the outset of lesson planning, reducing the retrofitting burden that otherwise falls disproportionately on itinerant specialists working under significant time constraints. Finally, family engagement should be treated as a partner in, rather than a peripheral consideration to, the design of a student's inclusive programming, since families often possess detailed knowledge of a student's functional vision, learning preferences, and prior exposure to compensatory skills that can meaningfully inform instructional planning.

12. CONCLUSION

Inclusive education holds substantial promise for students with visual impairment, offering exposure to broader curricula, richer social networks, and higher expectations than historical segregated models often provided. Realizing this promise, however, requires deliberate attention to the specific barriers this population faces: resource scarcity due to low incidence, inaccessible materials, inadequate teacher preparation, and gaps in the expanded core curriculum. Evidence-based practices such as structured co-teaching, early Braille instruction, Universal Design for Learning, and explicit self-determination instruction offer a practical roadmap for schools seeking to close the gap between the aspiration and the reality of inclusion. Continued research is needed, particularly given the low-incidence nature of this population, to build a stronger evidence base for practices that can be scaled across diverse educational systems.

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