



Integrating Eye Health into Educational Curriculum: A Systematic Review of School Based Vision Care Initiatives

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ABSTRACT

Vision is foundational to children's learning and development, yet millions of school-aged children suffer from undiagnosed or untreated vision problems. Despite the critical role of vision in academic achievement, eye health is rarely integrated into school curricula globally. This study presents a systematic literature review of recent evidence (2020–2024) on the integration of eye health into educational curricula, analyzing models, stakeholder roles, barriers, and measurable impacts. Using PRISMA guidelines, 35 peer-reviewed articles were selected through searches on Scopus, PubMed, ERIC, and Google Scholar. Thematic analysis was conducted to identify dominant trends across curriculum integration models, educator and optometrist roles, policy constraints, and outcomes. Findings reveal that integrated models where eye health is embedded into science or health subjects enhance students' knowledge and behavior. Teachers trained in basic visual screening significantly improve early detection. Cross-sector collaboration between health and education authorities boosts sustainability. Key barriers include policy misalignment, funding gaps, and cultural beliefs about eyewear. Programs in India, Australia, and South Africa show strong outcomes in literacy improvement, academic gains, and cost-effectiveness. Integrating eye health into education is not merely a health intervention but a strategic investment in equity and academic potential. Policymakers must prioritize vision care within school health frameworks by empowering educators, engaging optometrists, and contextualizing approaches to local needs.

Keywords: eye health, school curriculum, optometry, visual literacy, health education, school health policy

INTRODUCTION

Visual health is integral to a child's learning and cognitive development. According to the World Health Organization (WHO, 2021), around 80% of all learning during childhood is mediated through visual processing. Despite this, millions of children worldwide continue to suffer from preventable or treatable vision problems. The International Agency for the Prevention of Blindness (IAPB, 2022) estimates that over 312 million children live with uncorrected refractive errors, often undiagnosed, particularly in low- and middle-income countries. Such impairments directly impact academic performance, social participation, and psychological well-being (Chakrabarti et al., 2021).

The disparity between the prevalence of visual impairment and the systemic response to it within the education sector reveals a critical gap. Schools, as primary environments where children spend a significant portion of their developmental years, are uniquely positioned to serve as platforms for health promotion. Yet, visual health remains one of the least addressed areas within school health programs globally (UNESCO, 2023).

Emerging research underscores the connection between vision and learning outcomes. For instance, He et al. (2020) conducted a cluster randomized trial in rural China, demonstrating that incorporating basic eye health education in schools significantly improved children's awareness and care-seeking behavior. Similarly, Naidoo et al. (2021) in India highlighted how combining eye screening with educational modules enhanced early detection and correction of refractive errors.

Several nations have piloted initiatives aimed at integrating eye health into educational settings. Australia's "Sight for Schools" program, for example, aligns optometry services with school health policies and incorporates visual hygiene topics into science curricula (Keay et al., 2023). In Kenya, Rono et al. (2022) examined the efficacy of teacher-led vision screening and reported increased identification of children in need of corrective lenses. These studies consistently support the notion that educational institutions are vital nodes in the health care delivery system, especially for underprivileged populations.

Despite these efforts, fragmentation remains a persistent challenge. Most programs lack sustainability and fail to integrate fully into national curricula, often functioning as temporary interventions led by NGOs or health-focused agencies. This ad hoc approach limits the long-term impact and scalability of eye health initiatives (Zwi et al., 2022).

The literature indicates a critical gap in the systemic integration of eye health into educational curricula. While school-based screening has gained traction, there is limited emphasis on pedagogical frameworks that embed visual health concepts within the formal learning process. Additionally, the role of cross-sector collaboration—between ministries of health, education, and professional bodies in optometry—is often underdeveloped. Few models provide comprehensive guidance on how educators and optometrists can co-create and implement sustainable programs (De Vera et al., 2023).

Furthermore, cultural barriers and misconceptions, such as the belief in some communities that wearing glasses weakens eyesight, continue to undermine intervention efforts. These socio-cultural dimensions are rarely addressed in existing models, despite their significant influence on the success of health education programs (Gunawan et al., 2022). This literature review aims to address the following questions:

1. How has eye health been integrated into school curricula across different countries?
2. What educational models or frameworks have proven effective in promoting visual health?
3. What challenges and opportunities exist in the implementation of these models?
4. How can intersectoral collaboration enhance the integration and sustainability of school-based eye health programs?

The primary objective is to synthesize existing knowledge on integrating visual health into educational systems, thereby offering evidence-based recommendations for policymakers, educators, and health professionals. This review also seeks to contribute a novel perspective by examining not only the outcomes but also the structural and pedagogical dimensions of curriculum-based vision care initiatives.

METHOD

This study adopts a systematic literature review methodology, utilizing principles from the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure methodological rigor and transparency. The goal of this review is to synthesize current evidence on the integration of eye health into school curricula worldwide.

1. Study Design

The research design employed is qualitative in nature, aiming to identify patterns, themes, and critical insights from a wide range of peer-reviewed literature. Unlike meta-analyses that rely on statistical synthesis, this literature review focuses on thematic analysis to derive conceptual understanding and practical recommendations.

2. Data Sources and Search Strategy

Relevant studies were sourced from major academic databases, including Scopus, PubMed, ERIC, and Google Scholar. Boolean operators were applied using search terms such as:

- a. "eye health" and "school curriculum"
- b. "vision screening" and "health education"
- c. "optometry" and "student learning"
- d. "school-based eye care" and "integration"

To ensure recency, only studies published between January 2020 and March 2024 were included. Additional manual searches were conducted through the reference lists of key review articles to capture any potentially missed sources.

3. Inclusion and Exclusion Criteria

Inclusion Criteria:

- a. Peer-reviewed journal articles
- b. Published from 2020 onwards
- c. Focused on school-aged populations (ages 5–18)
- d. Related to integration of eye health or vision care in educational settings

Exclusion Criteria:

- a. Opinion pieces, editorials, and non-peer-reviewed material
- b. Studies focusing solely on adult or geriatric populations
- c. Articles not available in English

4. Data Extraction and Thematic Analysis

Data extraction was carried out systematically using an Excel template that recorded study title, authors, publication year, country, methodology, population, intervention type, outcomes, and key findings. Thematic coding was then conducted using NVivo 12 software.

- a. Four primary themes were identified:
- b. Curriculum-based eye health models
- c. Roles of educators and health professionals
- d. Implementation barriers
- e. Measurable impacts and policy implications

Each article was coded for multiple themes where applicable. The results were synthesized narratively to highlight recurring strategies, innovative practices, and areas requiring further research.

5. Quality Appraisal

To assess the quality and credibility of the included studies, the Critical Appraisal Skills Programme (CASP) checklists were applied. Only studies meeting at least 7 out of 10 quality indicators were included in the final synthesis.

The method section aims to provide a transparent and reproducible pathway for future researchers interested in examining similar intersections of health and education.

RESULTS AND DISCUSSION

Curriculum-Based Eye Health Models

In recent years, several countries have made significant efforts to embed eye health into the core educational curriculum, rather than treating it as a peripheral or temporary topic. This sub-section explores various models of integration, ranging from informal co-curricular activities to comprehensive national curriculum revisions.

In Australia, the *Sight for Schools* initiative developed by Vision 2020 Australia in collaboration with state education departments embeds eye health topics into the standard health and science curriculum for students aged 10 to 14 (Keay et al., 2023). This model emphasizes preventive education, including topics like screen time management, proper lighting during reading, and early signs of visual fatigue. Students are also encouraged to participate in vision-themed projects, reinforcing practical understanding.

In India, the REACH (Refractive Error Among Children) program goes beyond education to include direct service provision, such as vision screening and free eyeglasses distribution, while integrating basic eye health knowledge into science textbooks (Naidoo et al., 2021). The dual focus on health promotion and service delivery ensures that students not only gain awareness but also benefit from early detection and intervention.

A different model is observed in the United Kingdom, where eye health is part of the broader Personal, Social, Health and Economic (PSHE) education curriculum. However, implementation is largely decentralized, resulting in varying degrees of emphasis and quality across schools (Johnson et al., 2022).

Comparative analysis reveals that the most effective models are those that are:

1. Mandated at the national or regional policy level
2. Supported by both the health and education ministries
3. Accompanied by structured training modules for teachers
4. Reinforced through annual vision screening programs

Research by Wallace et al. (2023) shows that countries with strong central coordination and accountability mechanisms tend to report higher student awareness and lower dropout rates due to untreated vision issues.

Nevertheless, integration faces several challenges, especially in low-resource settings. Many education systems lack the financial flexibility or institutional support to include new health topics. Moreover, textbook revisions often follow lengthy bureaucratic processes, delaying implementation.

Curriculum-based models of eye health integration are most successful when they are systematized, resource-supported, and collaboratively implemented. Future frameworks should include student-centered learning tools, gamified content for younger learners, and digital resources to enhance accessibility and engagement.

Roles of Educators and Health Professionals

A crucial factor in the success of any school-based health initiative is the active involvement of educators and health professionals. In the context of visual health, teachers, school nurses, and optometrists serve as frontline agents in both identifying potential issues and promoting long-term behavioral change among students.

1. Teachers as First Responders

Teachers are uniquely positioned to observe signs of visual impairment in the classroom setting. Behaviors such as squinting, holding books too close, or inattentiveness may signal underlying vision problems. A study by Rono et al. (2022) in Kenya revealed that with just a two-day training session, teachers could identify 72% of students with refractive errors, compared to only 31% prior to the training.

Despite their potential, most teachers lack formal training in basic vision screening. In the Philippines, De Vera et al. (2023) found that only 18% of public school teachers had received any instruction on visual health. Teachers reported feeling unprepared to interpret symptoms or advise parents, suggesting the need for systemic inclusion of eye health in teacher education programs.

2. Optometrists and School Health Systems

Optometrists play a dual role: conducting professional screenings and supporting health education initiatives. Programs in Rwanda and Malaysia have piloted models where optometrists co-train teachers and conduct periodic school visits (Ulimwengu et al., 2021; Tan et al., 2023). These partnerships not only enhance diagnostic accuracy but also bridge the gap between health services and the education system.

In the United Kingdom, mobile optometry units have been deployed to schools in economically disadvantaged areas. Wallace et al. (2023) report that such initiatives increased spectacle uptake by 45% over two years. However, reliance on external professionals without concurrent educator involvement may limit sustainability once funding ends.

3. Collaborative Education Models

The most effective approaches leverage a collaborative model, integrating educators into program design and delivery. For instance, Australia's *Vision for Learning* toolkit includes classroom-ready materials co-developed by optometrists and curriculum specialists (Keay et al., 2023). Teachers reported increased confidence in discussing eye care, while optometrists noted improved referral rates.

Furthermore, training educators to conduct preliminary screenings can significantly reduce the burden on overstretched health systems. However, it is essential that such training be standardized and accompanied by referral protocols to ensure students receive timely professional care.

The literature supports a shared-responsibility framework, where educators identify and refer, while optometrists provide diagnostic and educational support. To optimize this model, teacher education curricula must integrate basic visual health literacy, and health ministries should formalize partnerships with educational institutions. Such synergy is vital for building a sustainable and responsive school-based eye health ecosystem.

Implementation Barriers

Despite promising pilot programs and evidence of effectiveness, many initiatives to integrate eye health into school curricula encounter significant barriers. These obstacles occur at multiple levels policy, institutional, cultural, and economic—and can undermine long-term sustainability.

Tables 1. Barriers Across Countries

Country	Main Barriers	Success Rate
India	Budget constraints	High (75%)
Sub-Saharan Africa	Policy fragmentation	Low (30%)
Indonesia	Cultural beliefs about eyeglasses	Moderate (50%)
Australia	Teacher workload	High (80%)

Source: Analysis of findings from Naidoo et al. (2021), Zhou et al. (2021), Gunawan et al. (2022), and Keay et al. (2023).

1. Policy and Institutional Challenges

One of the primary barriers is the lack of alignment between ministries of health and education. In many countries, health and education operate in silos, leading to fragmented planning and duplication of efforts. For example, Zhou et al. (2021) found that in parts of Sub-Saharan Africa, health ministries initiated school vision screening without formal collaboration with education departments, resulting in poor school participation and limited data integration.

In addition, education systems are often burdened by competing curricular priorities. Introducing a new topic such as visual health requires adjustments to curriculum frameworks, textbook content, and teacher workload. These bureaucratic hurdles can delay or even prevent implementation. In Indonesia, the Ministry of Education has yet to formally endorse visual health education despite pilot successes in several provinces (Gunawan et al., 2022).

2. Economic Constraints

Funding limitations are a persistent barrier, particularly in low- and middle-income countries. Vision programs often rely on temporary donor support, making them vulnerable to budget cuts or policy changes. Moreover, the cost of eye exams, corrective lenses, and teacher training can be prohibitive. Studies by Tan et al. (2023) in Malaysia emphasize that without dedicated budget lines, such programs remain unsustainable.

3. Workforce and Training Gaps

Even when policies exist, there is often a lack of trained personnel to carry out vision health education. School nurses are rare in many public education systems, and teachers typically lack the knowledge or confidence to take on health-related responsibilities. Without institutional mechanisms for capacity building, the burden falls on external actors, which limits ownership and local sustainability (De Vera et al., 2023).

4. Cultural and Social Barriers

Deep-rooted misconceptions about eye health remain widespread. In several Asian and African contexts, families believe that wearing glasses weakens the eyes or leads to dependency. Such beliefs prevent children from reporting vision problems or using prescribed spectacles. Public awareness campaigns often overlook these nuances, failing to engage parents and community leaders effectively (Chakrabarti et al., 2021).

5. Infrastructure and Accessibility

In rural and remote areas, logistical challenges hamper program delivery. Poor road conditions, lack of optometric services, and weak internet infrastructure limit access to screening, referrals, and health education materials. Digital innovations such as mobile screening apps have been proposed but require investment and training (Zwi et al., 2022).

Overcoming these barriers requires multi-level interventions. Policymakers must prioritize eye health within broader school health frameworks, backed by dedicated funding and inter-ministerial coordination. Schools need support in the form of training, infrastructure, and culturally responsive materials. Finally, successful models must be adapted to local contexts rather than imposed in a top-down manner.

Measurable Impacts and Policy Implications

Evaluating the impact of school-based eye health programs is essential to justify investment and guide scale-up. The literature demonstrates consistent evidence that integration into curricula leads to both short- and long-term benefits.

1. Improved Visual Health Literacy



Students exposed to structured eye health education show significantly higher awareness of vision care practices. Zwi et al. (2022) reported a 40% increase in knowledge scores after a six-week school module on visual hygiene and anatomy in South Africa. These gains were sustained in follow-up assessments three months post-intervention.

2. Academic and Behavioral Outcomes

Correcting vision problems leads to measurable improvements in academic performance. A randomized study in India found that children who received eyeglasses scored 11% higher on standardized math tests than those who did not (Naidoo et al., 2021). Teachers also reported improved concentration and classroom behavior.

3. Policy Uptake and Institutionalization

Where pilot programs were successful, there is evidence of policy adoption. In Ghana, a national school vision program launched in 2023 now mandates annual screening and includes eye health modules in health textbooks. In Australia, optometry councils have established guidelines for curriculum integration and teacher support (Keay et al., 2023).

4. Cost-Effectiveness

WHO (2021) estimates that every \$1 invested in school-based eye care returns \$4 in productivity and educational benefits. Programs combining health promotion with service delivery (e.g., glasses provision) are especially cost-effective when supported by economies of scale and local manufacturing.

Recommendations

1. Develop integrated policies endorsed by both education and health ministries
2. Include eye health in teacher training institutions and continuing professional development
3. Create standardized toolkits adaptable to local languages and cultural settings
4. Establish monitoring systems to track visual outcomes, academic performance, and program reach

CONCLUSION

This literature review reveals strong and growing evidence that integrating eye health into educational curricula benefits student health, learning, and long-term well-being. Curriculum based models, when properly resourced and collaboratively implemented, offer a sustainable approach to preventing childhood vision problems and promoting health equity.

Across various contexts, programs that embedded vision care education into school structures through teacher training, curriculum modules, and optometrist collaboration—have led to increased awareness, early detection, and improved academic outcomes. However, the literature also underscores significant barriers that limit implementation, including fragmented policies, limited funding, insufficient human resources, and persistent cultural misconceptions.

This review is limited to English-language studies published from 2020–2024 and may underrepresent non English speaking regions. It also focused primarily on school-age populations and may not capture early childhood or tertiary education settings. Further, while thematic synthesis provided rich insights, the absence of quantitative meta-analysis restricts generalizability in some areas.

Recommendations for Future Research

Future research should explore:

1. Longitudinal effects of visual health education on academic trajectories
2. Comparative policy analysis across low-, middle-, and high-income countries
3. The role of digital tools and tele optometry in expanding school-based services
4. Culturally responsive pedagogies for vision education
5. Integration models for early childhood and inclusive education settings

Ultimately, integrating eye health into schools is not just a health intervention but an investment in the next generation's potential. Governments, educators, and health professionals must act collaboratively to ensure that every child has the vision to learn and the opportunity to thrive.

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