THE ROLE OF TEACHERS IN THE EARLY IDENTIFICATION OF VISUAL PROBLEMS IN SCHOOL-AGE CHILDREN: KNOWLEDGE, ATTITUDES, AND PRACTICES

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Abstract

Background: Teachers are positioned to observe functional signs of visual difficulties during routine classroom activities, although clinical diagnosis remains the responsibility of qualified eye-care professionals. Timely recognition and appropriate referral may support children's access to learning. Objective: To examine knowledge, attitudes and self-reported classroom practices related to refractive errors among primary-school teachers in the Municipality of Tetovo, North Macedonia. Methods: This quantitative, cross-sectional questionnaire study included 115 teachers recruited through non-probability sampling. The questionnaire covered demographic and professional characteristics, prior eye-health training, attitudes, observations of pupils' visual behaviours, perceived causes of refractive errors and classroom adaptations. Descriptive statistics and subgroup comparisons previously reported in the doctoral dissertation were summarised; no new inferential analyses were performed. Results: Only 19 teachers (16.52%) reported previous eye-health training. Difficulty reading from the board (44.35%), holding books close to the eyes (43.48%) and frequent eye rubbing or blinking (40.87%) were frequently reported observations. Changing a pupil's seating position was the most common classroom adjustment (68.69%). Support for vision screening at school entry was reported by 65.22%, while 98.26% considered additional eye-health knowledge important. Attitude categories were not significantly associated with sex, age, teaching type, residence or prior training (all $p > .05$).
Conclusions: Teachers reported potentially useful observational and adaptive practices, but limited training and uneven specific knowledge point to a need for structured professional education and coordinated referral and follow-up pathways. The findings are limited to self-reports from a non-probability sample in one municipality and cannot establish the clinical accuracy of teachers' observations. A practical observation-and-referral framework is proposed for future evaluation.

Keywords: refractive errors; teachers; early identification; school vision; inclusive education

1. Introduction

Vision supports reading, writing, orientation and participation in classroom learning. Uncorrected refractive errors are a major cause of avoidable visual impairment, and children may not always recognise or report their own visual difficulties (World Health Organization, 2019). Functional classroom signs can include difficulty seeing the board, bringing reading material unusually close or experiencing visual discomfort. Such signs are not specific diagnoses and require professional assessment. Teachers have repeated opportunities to observe pupils in authentic learning situations. Previous research has examined teacher knowledge of refractive errors and the potential contribution of appropriately trained school personnel to visual-health referral pathways (Alemayehu et al., 2018; Krumholtz, 2004; Latorre-Arteaga et al., 2016). In inclusive education, observation should lead to reasonable classroom adjustments and communication with families rather than diagnostic labelling (Miyauchi, 2020). This study aimed to examine knowledge, attitudes and reported practices concerning early recognition of refractive errors among 115 primary-school teachers from the territory of the Municipality of Tetovo, North Macedonia. It specifically considered functional signs, perceived causes, classroom responses and professional training needs.

2. Materials and Methods

2.1. Study design and participants

This quantitative, cross-sectional, descriptive-analytical study used the teacher-questionnaire component of a doctoral dissertation. The sample comprised 115 primary-school teachers from the Municipality of Tetovo. Recruitment was non-probability based; therefore, results should not be interpreted as nationally representative.

2.2. Instrument and data collection

Teachers completed a structured self-report questionnaire covering sociodemographic characteristics and previous eye-health training; ten Likert-type attitude statements; observations of pupils and classroom adaptations; and knowledge and perceived causes of refractive errors. Several questions allowed multiple responses. Participation was voluntary and responses were analysed in aggregate. The present paper does not analyse the separate clinical registry component of the dissertation.

2.3. Statistical analysis

Descriptive results are reported as counts, percentages, means and standard deviations where available. The dissertation compared attitude categories by demographic and professional characteristics, reporting p values for subgroup comparisons. A threshold of $p < .05$ was used for statistical significance. No new inferential tests were calculated for this paper.

3. Results

3.1. Participant characteristics

The sample included 93 women (80.87%) and 22 men (19.13%); mean age was 40.3 ± 10.3 years. Participants represented both classroom and subject teaching, and 65 (56.52%) reported rural residence. Only 19 (16.52%) had received eye-health training.

Table 1. Sociodemographic and professional characteristics of teachers (N = 115)

Characteristic	Value
Women / men	93 (80.87%) / 22 (19.13%)
Age, mean ± SD	40.3 ± 10.3 years
Urban / rural residence	50 (43.48%) / 65 (56.52%)
Classroom / subject teachers	53 (46.09%) / 62 (53.91%)
Previous eye-health training: yes / no	19 (16.52%) / 96 (83.48%)

3.2. Attitudes toward refractive errors

The ten-item attitude score was 43.18 ± 4.10 (median 43; interquartile range 41–46). Using the dissertation's median-based categorisation, 54 teachers (46.96%) were classified in the more favourable group and 61 (53.04%) in the less favourable group. This is a sample-specific split rather than a validated clinical or professional competency threshold. Agreement that vision screening should take place at school entry was 65.22%; 50.43% agreed with the item concerning myopia being more frequent in younger people.

3.3. Observed difficulties and classroom adjustments

The most frequently reported functional observations were difficulty reading the board (44.35%), holding reading materials close to the eyes (43.48%) and frequent rubbing or blinking (40.87%). These observations are teacher-reported behaviours, not confirmed refractive diagnoses.

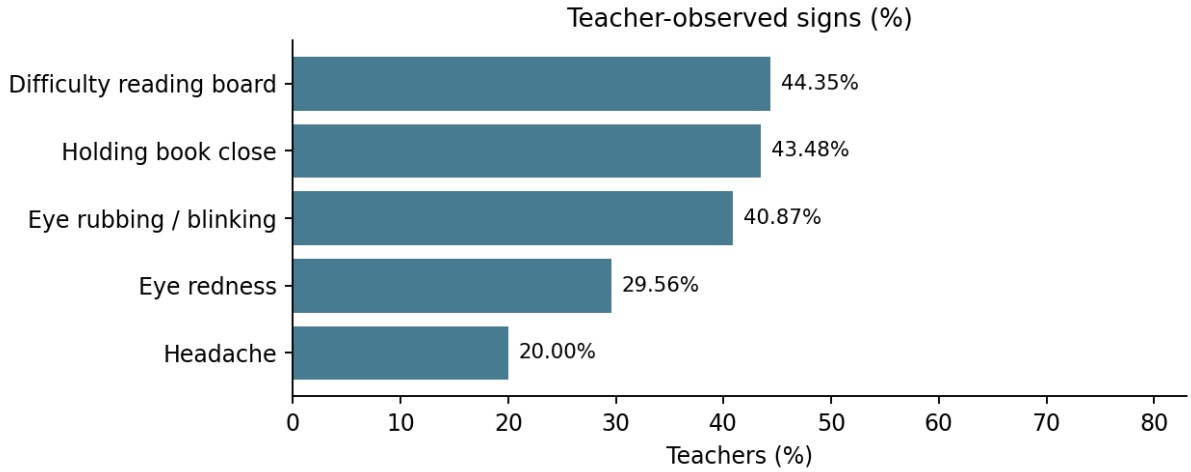


Figure 1. Visual difficulties reported by teachers during classroom activities.

The most commonly reported response was changing a pupil's seating position (68.69%), followed by reading aloud information written on the board (39.13%) and checking board legibility (31.30%). These are useful adjustments but cannot substitute for examination or prescribed optical correction**.**

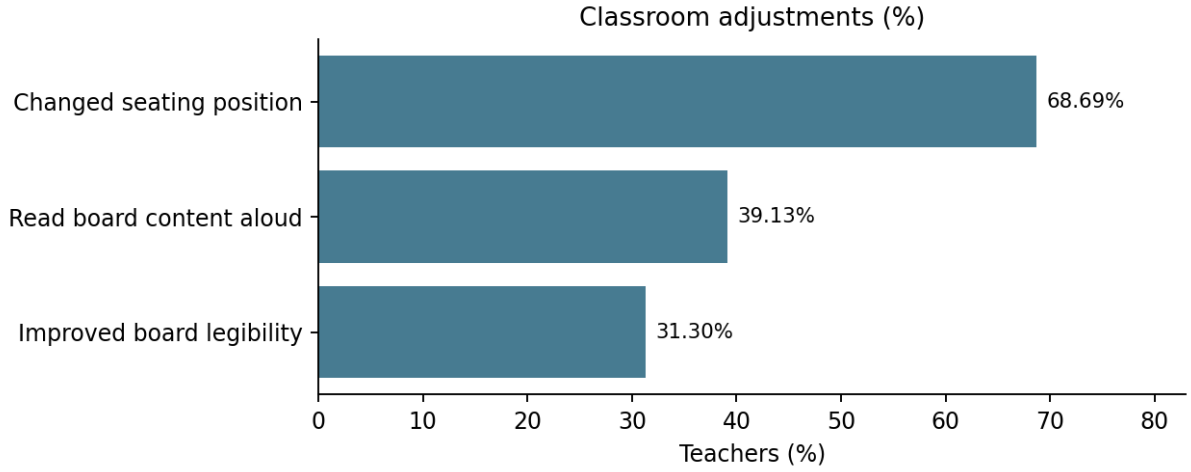


Figure 2. Classroom adjustments reported by teachers.

3.4. Knowledge and perceptions

Knowledge was uneven. Only 33.91% selected the response concerning the shape of the eye and light focusing as the cause of refractive error; 60.87% identified eye examination/retinoscopy as a detection method. Almost all respondents (98.26%) considered additional eye-health knowledge important. Teachers also expressed beliefs about screen proximity and lighting; these survey responses describe perceptions and must not be treated as proof of causation**.**

Table 2. Selected knowledge and communication indicators (N = 115)

Indicator	Teachers (%)
Correct optical/focusing explanation selected	33.91
Eye examination/retinoscopy identified for detection	60.87
Parents provide detailed information on child's refractive error	60.87
Further eye-health knowledge considered important	98.26
Screen proximity perceived as a cause	88.69

3.5. Subgroup comparisons

The dissertation found no statistically significant association between the median split attitude category and sex ($p = .27$), place of residence ($p = .09$), age ($p = .84$), teaching type ($p = .07$), spectacle use ($p = .76$) or prior eye-health training ($p = .97$). These nonsignificant results should not be interpreted as evidence of equivalence between groups.

4. Discussion

The findings reveal a distinction between broad support for eye health and more limited specific knowledge. Teachers reported recognising behaviours relevant to classroom visual functioning, but several knowledge questions showed uncertainty or misconceptions. The low proportion of previously trained teachers (16.52%) suggests a practical opportunity for professional development. This interpretation is consistent with studies describing gaps in teacher knowledge and potential benefits of targeted training (Alemayehu et al., 2018; Krumholtz, 2004; Omar et al., 2019). Difficulty reading the board and holding a book close were the most common observations, while seating changes were the dominant response. These adjustments may reduce immediate classroom barriers, but the underlying visual status cannot be determined from observation alone. Structured communication with families and qualified eye-care services is therefore essential. School-based implementation research also highlights the need for clear referral and follow-up systems rather than screening without subsequent care (Latorre-Arteaga et al., 2016). An inclusive response should be based on a pupil's functional needs: readable materials, adequate illumination and contrast, accessible presentation of information and sufficient time. Universal design for learning can support pupils while they await professional assessment and after correction has been prescribed (Meyer et al., 2014; Miyauchi, 2020). The absence of significant differences in overall attitude categories across demographic groups suggests that training should be offered broadly, not restricted to a single teacher subgroup. However, the sample is geographically limited, non-probability based and reliant on self-report. The study did not test whether teacher observations corresponded to clinical findings or whether any proposed referral protocol improves outcomes.

5. Conclusions and Recommendations

Teachers in the Municipality of Tetovo reported several potentially useful early-warning observations and classroom adaptations, but limited formal training and uneven knowledge underline the need for a coordinated, practical approach. The school's role is educational and observational; diagnosis and refractive management remain the responsibility of qualified eye-care professionals**.**

5.1. Recommendations derived from the doctoral dissertation

First, strengthen early school-age vision screening through professionally standardised procedures, equitable access in urban and rural settings, and documented referral and follow-up. Second, incorporate practical visual-health modules into continuing teacher education, including recognition of functional signs, effects of uncorrected vision on learning and appropriate classroom adjustments. Third, establish clear communication pathways among schools, families, school support staff, primary care and ophthalmic services, with appropriate confidentiality safeguards. Fourth, provide function-oriented adaptations such as suitable seating, illumination, reduced glare, accessible print and contrast, alternative modes of presenting content and additional task time where required. Fifth, incorporate visual health into inclusive education policy and provide accessible, evidence-based parent information that counters misconceptions and stigma around spectacles. Finally, evaluate teacher training and referral pathways in future intervention studies.

5.2. Proposed teacher observation and referral pathway

A five-stage practical framework is proposed: (1) OBSERVE recurrent functional signs during reading, writing and board work; (2) DOCUMENT what was seen, when and in which learning context, without assigning a diagnosis; (3) ADAPT classroom conditions to the pupil's immediate needs; (4) COMMUNICATE with the family and school support service and REFER for qualified visual assessment; and (5) FOLLOW UP on recommended educational adjustments and referral completion. Sudden vision loss, severe eye pain or eye injury requires urgent medical assessment. This is a proposed educational pathway, not a clinically validated screening instrument; institutional adoption requires professional review and pilot evaluation**.**

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