INTERNATIONAL REVIEW OF THE LITERATURE OF EVIDENCE OF BEST PRACTICE MODELS AND OUTCOMES IN THE EDUCATION OF BLIND AND VISUALLY IMPAIRED CHILDREN

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The National Council for Special Education was established under the Education for Persons with Special Educational Needs Act 2004 (EPSEN Act 2004) with effect from the 1st October 2005. The Council was set up to improve the delivery of education services to persons with special educational needs with particular emphasis on children.

Acknowledgements

Foreword

The National Council for Special Education (NCSE) was formally established in 2005 under the Education for Persons with Special Education Needs Act 2004 (EPSEN) to improve the delivery of education services to persons with special educational needs, with particular emphasis on children.

Commissioning, conducting and publishing research to provide an evidence base to support its work are key functions of the NCSE. It is now widely acknowledged that research evidence has a very valuable role to play in the development of policy and practice. Reports from the NCSE research programme, including this one, will be key sources, amongst others, that will assist the NCSE in carrying out its work and in developing policy advice to the Minister for Education and Science on special education matters, another of the NCSE's statutory functions. The reports will also assist in identifying and disseminating to schools, parents and other appropriate stakeholders, information relating to best practice concerning the education of children with special educational needs.

This research report was commissioned to provide the NCSE with an international review of the literature relating to best practice models and outcomes in the education of blind and visually impaired children. The researchers have systematically compiled key lessons from a very broad range of international literature. They have also identified a number of recommendations and implications arising for the Irish context, which the NCSE will now need to consider in carrying out its work and in developing its own policy advice to the Minister for Education and Science.

Pat Curtin,

Chief Executive Officer

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Abbreviations

CCTV	closed-circuit television (a type of LVA)
CVI	cortical visual impairment
DES	Department of Education and Science
ICT	information and communications technology
ILS	independent living skills
LVA	low vision aid
M&I	mobility and independence
MDVI	multiple disabilities and visual impairment
MQ	mandatory qualification required by teachers who teach visually impaired children (UK)
NCSE	National Council for Special Education
O&M	orientation and mobility
QTVI	qualified teacher of visually impaired children (UK and United States)
UK	United Kingdom
VI	visually impaired; visual impairment

Throughout the report the authors use the term "visual impairment". This covers blindness and partial sight or low vision. The terms "visually impaired children" and "children with visual impairment" are used interchangeably.

Some countries employ classroom staff who do not have trained teacher status. Different countries have different names for this "assistant" role (for example "para-educator", "teacher aide", "teaching assistant"). In Ireland, "special-needs assistants" often provide classroom support for visually impaired children, though, importantly, they formally have a care role rather than a learning support role. In the review we make use of the generic term

"teaching assistant", but when making specific reference to Ireland we use the more specific term "special-needs assistant". A section of the report discusses this topic, section 3.3.5, "Learning support in school: The role of teaching assistants."

Executive Summary

Context and method

In May 2008 the National Council for Special Education invited tenders for conducting an international review of the literature of evidence of best-practice models and outcomes in the education of blind and visually impaired children. A team from the Visual Impairment Centre for Teaching and Research at the School of Education, University of Birmingham, and St Patrick's College, Dublin, responded to this invitation and was awarded the contract. The work was carried out in the autumn of 2008 and then modified in response to feedback from the NCSE in the spring of 2009.

The approach to the literature review involved the following:

- Agreeing a broad topic framework for the literature
- Stage 1 review (initial review of the visual impairment literature)
- Appraisal of the topic framework based upon findings in stage 1 of the review
- Stage 2 review (broader systematic searches of electronics databases).

Report structure

The report is split into six sections:

Introduction and background

Method

Review context: Legislation, policy and service delivery

Review focus: Classroom and the curriculum

Review focus: Additional curriculum needs

Consideration of implications for Ireland.

This structure reflects how the reviewers split the literature between "review focus" and "review context". The former was identified as central to the purpose of the review, while the latter provided useful context.

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The literature review resulted in approximately 325 relevant references. Topics are described and summarised in turn. The nine review focus topics have associated evidence-based recommendations. A final section considers the review in the Irish educational context and presents six "Implications for Ireland". The nine recommendations and six implications are listed in the Executive Summary.

Recommendations

The review team presents the following recommendations based upon evidence gathered in the literature review.

1. Assessment of learning needs

Given the challenges posed by access to assessments for children with visual impairment, professionals involved in assessment should

- ensure that they are cautious in their use and interpretation of mainstream assessment tools when they are applied to children with visual impairment;
- where appropriate, make use of specialist procedures designed for children with visual impairment (for example the assessment of Braille reading).

Consideration should be given to providing training opportunities to ensure that professionals are competent in using and interpreting assessment tools for children with visual impairment.

Consideration should also be given to developing new (or modifying existing) specialist assessment procedures for specific use in Ireland.

2. Pedagogy and teaching strategies

To ensure appropriate access for children with visual impairment, educational services with responsibility for curriculum design and delivery in Ireland will need to

- incorporate pedagogical strategies that are structured around "alternative" or "enhanced" modalities of presentation and communication;

- recognise that these adapted methods of teaching may require more time than conventional teaching strategies;
- ensure that due consideration is given to areas of the "additional" curriculum that are "over and above" the mainstream curriculum (for example mobility and independence education, Braille tuition, daily living skills, etc.).

3. Access to public examinations

The procedures described by the Advisory Group on Reasonable Accommodations (AGRA 2007) offer a suitable framework for considering the public examination access needs of pupils with sensory needs. It is recommended that reference be made to this framework in reviewing the particular access needs of children with a visual impairment in Ireland to ensure that their needs are met. An exploration of the use of digital question papers may also be helpful (as in Scotland).

4. Print literacy

Given the particular challenges children with visual impairment face in accessing print literacy, specialist services with responsibility for supporting their education will need to

- ensure that a child's optimal print size is established as part of a functional visual assessment;
- recognise that, while teaching children using large print (i.e. large text presented on paper) is a useful technique for providing optimal print size in some circumstances, priority should be given to teaching children to use low-vision aids (LVAs) effectively to optimise their access to print.

5. Braille literacy

Braille offers a well-established and well-researched route to literacy for some blind children. Deciding about the most appropriate medium of literacy for children with low vision or a deteriorating condition requires careful consideration. It is recommended, therefore, that specialist services with responsibility for supporting children with visual impairment ensure that appropriate expertise is available for undertaking an assessment of a child's literacy

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needs, with appropriate reference to the range of guides that have been developed to assist with this decision-making process. This assessment will need to acknowledge that

- while Braille may be an appropriate route to literacy for most blind children, in some cases children may need to learn through print *and* Braille simultaneously;
- Braille may not be appropriate for some children with very low vision, including those with multiple disabilities and visual impairment (MDVI). Alternative tactile codes, such as Moon, should be considered as possible routes to literacy for some children;
- given the particular demands of learning Braille, appropriate expertise, resources and adaptive technology will need to be available to support children in mainstream settings;
- the co-ordinated central or regional production of Braille materials probably remains essential. However, developments in technology make it increasingly possible to store electronic files (for example textbooks) centrally. These files can then be distributed through the internet and produced locally in the school or at home, at the preferred time and in the child's preferred format.

6. Mobility and independence

Children with visual impairment (particularly severe visual impairment) are often developmentally delayed in relation to motor development. However, there is clear evidence that they can be taught mobility and independence skills, given appropriate support. It is recommended that

- visually impaired children should be assessed to establish their needs in relation to mobility and independence;
- services should provide appropriate teaching to visually impaired children in the area of mobility and independence;
- this teaching is likely to require one-to-one work with a mobility teacher, in combination with consistent practice and reinforcement from other carers (especially parents in the early years).

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7. Social and emotional inclusion

There is general acceptance of the importance and benefit of early identification and interventions to encourage social development in young children with visual impairment.

While the literature review did not identify a study to demonstrate the efficacy of these interventions categorically, it is recommended that

- services should identify children as soon as possible after diagnosis of their visual impairment and offer support and advice to carers in relation to encouraging communication and early development.

Among older children and young people there is also a broad consensus in the literature that visual impairment can be associated with isolation at school as well as challenges in forming friendships (including mainstream school). It is recommended that

- services can usefully provide interventions that support the personal development of the visually impaired child (for example assertiveness training and communication skills), as well as the training of sighted peers (for example to improve sighted children's attitudes towards visually impaired children).

While visually impaired children can benefit from such support at various points in their school career, it might be targeted at times when children are particularly vulnerable (including when vision is deteriorating, at transition between schools, and in later teenage years).

8. Information and communications technology

"Access technology" (for example screen magnifiers and screen readers) is an important tool for visually impaired children in accessing the curriculum. Beyond general access, technology offers the potential for teaching particular curriculum areas (for example visual training and Braille) and has particular benefits when working with children with MDVI. It is recommended, therefore, that

- visually impaired children should be given appropriate training in order to make effective use of access technology (for example training in touch-typing, training in the use of particular access software);

- educators should also draw upon relevant technology to support their teaching of particular curriculum areas to visually impaired children.

9. Low vision training

The majority of visually impaired children have some remaining or "residual" vision. It is recommended that

- specialist services should carry out regular functional visual assessments of visually impaired children to enable professionals to design appropriate educational interventions;
- such assessments should draw upon the views, expertise and assessments of a broad range of stakeholders, including optometrists, ophthalmologists, teachers, and parents;
- when low-vision aids have been prescribed, appropriate training should be provided for staff and pupils to reduce their low take-up in educational settings.

Implications for Ireland

The review team presents the following implications in an attempt to support the NCSE in applying the outcomes of the review in Ireland.

1. Educational services for visually impaired children: Teaching and curriculum requirements

The review makes a clear distinction between the "mainstream" and "additional" curriculum. Drawing upon this, the review offers evidence-based recommendations of the teaching and curriculum requirements of educational services for children with a visual impairment. The recommendations presented in the review offer the basis for developing coherent national standards that can be used for

- designing and developing service provision
- reviewing service delivery.

Reference can be made to standards that exist in other countries (for example the UK), but central to the development of the standards should be the evidence-based recommendations and the Irish policy and service context.

The application of such standards could be used to determine the adequacy of current models of learning support for visually impaired children in Ireland and could determine whether additional models of learning support and resource need to be considered.

2. Inter-agency working and systems

Given the importance of ensuring that there are effective links and referral routes between health and education services for identifying and supporting children with visual impairment, it would be helpful to review areas of provision that particularly demand inter-disciplinary communication. These areas include:

- the provision of low vision services
- the diagnosis, planning and delivery of early intervention programmes for visually impaired children and babies
- mobility and independence education.

3. Educational infrastructure

The literature review shows that access to the curriculum by visually impaired pupils requires the availability of additional materials and equipment. The processes by which equipment and resources are provided to visually impaired pupils and their families as well as their teachers could therefore be usefully reviewed to ensure that clear procedures exist. This review might also ensure that there are mechanisms for the rapid replacement or maintenance of damaged equipment.

4. The role of special schools and specialist centres

The existing designated special school for pupils with a visual impairment in Ireland plays an important role in providing resources and related services. Consideration could be given to providing resources to St Joseph's Centre for the Visually Impaired to enable it to develop these services further. As an example, the development of professional training might be

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enhanced through developing a link between St Joseph's and a higher education institute in Ireland in addition to the existing links with the UK.

5. Professional training

The review suggests that the teaching of children with visual impairments requires input from professionals with appropriate training.

- The development of standards for teachers who work with children with a visual impairment may be useful, as they will provide guidance for the training required by staff members working with visually impaired children.
- A review of appropriate training routes for professionals working with children with visual impairment would be helpful. This includes training routes for specialist advisory teachers, special-needs assistants, and potentially short courses, particularly in the area of Braille teaching and mobility and independence education.

6. Identification of visually impaired children

The numbers of children with a visual impairment being supported in the education system at present seem low (based on prevalence estimates in the UK). It may be that children with visual impairment—particularly those with additional disabilities—are not known to the visiting teacher services and are not receiving the services they require. A formal analysis of the prevalence and size of the population of visually impaired children is therefore required. Given similarities in population size and density, the established method of profiling childhood visual impairment in Scotland is one option that could helpfully be considered for use in Ireland.

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1. Introduction and Background

1.1 Funding and purpose

In May 2008 the National Council for Special Education issued an invitation to tender for conducting an international review of the literature of evidence of best-practice models and outcomes in the education of blind and visually impaired children.

The invitation to tender referred to the following specific tasks:

- To provide a review of the international literature available on the educational models for blind and visually impaired children that demonstrates evidence-based outcomes for the child.
- To identify the extent to which education and health services need to be co-ordinated in meeting the needs of this cohort.
- Drawing upon the findings, and taking into account the provision of education in an inclusive setting, to make recommendations as to the best provision of this service in Ireland with a view to informing national policy and also to consider the needs of educators in this regard.
- To provide an overview of the implications for the practical implementation of such recommendations for the existing Irish education and health systems.

A team from the Visual Impairment Centre for Teaching and Research at the School of Education, University of Birmingham, and St Patrick's College, Dublin, responded to this invitation and was awarded the contract to carry out the work. The work was carried out in the autumn of 2008.

1.2 Introduction

In recent years, policy developments in Ireland have moved forward considerably through the enactment of the Education for Persons with Special Educational Needs (EPSEN) Act (2004) and the formal establishment of the National Council for Special Education in 2005. However, it should be noted that the implementation of the act has been deferred indefinitely, and only a small number of sections have so far been commenced. The new provisions of the Disability

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Act (2005) are also important in this regard, most notably part 2, which deals with children aged up to 5 years. Thus the EPSEN Act and the Disability Act, implemented in tandem, provide a structured legislative framework in which the needs of children with disabilities or SEN can be adequately assessed, supported and monitored at all levels of education (including early, third-level and continuing education).

This literature review is intended to capture knowledge of best practice in educational provision for children and young people with visual impairment. Before turning to the research evidence and policy guidance we summarise the existing map of educational provision as well as some of the significant recent influences on policy and provision in order to set the literature review in the Irish context. We revisit this in the final section of the report.

1.3 Educational provision for students with visual impairment in Ireland

Existing policy on the education of students with special educational needs in Ireland recognises the need for a continuum of support and provision. Consequently, a range of educational provision exists to meet the varying needs of children and young people with visual impairment. We have not identified reliable studies of the prevalence of visual impairment in Ireland (as discussed as part of the review). The National Physical and Sensory Disability Database contains information about individuals with physical and sensory disabilities, including their diagnostic category and the extent to which they experience "activity limitation and participation restriction." However, the NCSE Implementation Report (NCSE 2006) points out that a comparison with census figures suggests that slightly more than half those with sensory or physical disabilities are listed on the database. (The review revisits the specific issue of identifying children.) The Implementation Report itself does not give separate estimates for physical and sensory disabilities.

1.3.1 Mainstream provision

Most students with visual impairment are educated in ordinary classes in mainstream primary and post-primary schools (see table 1 for figures) with the support of a learning-support or resource teacher and, in many cases, a special-needs assistant. Significant numbers are in

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special schools (schools not specifically for visual impairment, including schools for children with severe or profound general learning difficulties).

Visual impairment is classified as a low-incidence disability (DES 2005) and therefore is eligible for discrete funding and individual support. In relation to visual impairment, each child assessed as having a visual impairment is allocated a maximum of 3.5 hours from a resource teacher in mainstream primary schools (DES 2005). Generally the allocation of hours on the grounds of low-incidence SEN is mirrored in mainstream post-primary schools. In addition, these pupils are entitled to additional support from the visiting teacher service. It should be noted that this is lower than the maximum 4 hours allocated to pupils with a hearing impairment and the 5 hours allocated to each pupil with ASD. However, pupils having both a visual impairment and some other serious disability may be assessed as having a multiple disability and be allocated the maximum of 5 hours. While the allocation of resource teaching for students with visual impairment is sanctioned on the basis of individual applications, the DES (2005) recommends that resources should be employed in the manner that best meets the needs of the pupils with special educational needs (SEN). Special-needs assistants (SNAs) are recruited specifically to assist with the care of pupils with disabilities in an educational context. They may be appointed to special schools or to mainstream schools to assist the school authorities in making suitable provision for a pupil or pupils with special-care needs arising from a disability (DES 2002). Principals may apply individual SNA resources to support several pupils with special needs. This may involve the deployment of the SNA in non-teaching duties in more than one classroom (DES 2005).

The visiting teacher service for pupils with visual impairment was established in 1978. By the time evidence was collected by the Special Education Review Committee (1993) the service consisted of only three teachers, who were able to visit individual pupils on average only about once a term. It was acknowledged that having three teachers for the entire country was unsatisfactory, and in the early 1990s the visiting teacher services for pupils with visual impairment and hearing impairment were amalgamated and restructured. According to Willliams (2007), this meant that for a few years this service had an expanded role (including catering for pupils with Down syndrome who were integrated in mainstream classes), but with the advent of resource teachers in 1999 they reverted more or less to their original brief. Williams reports that there is no Irish research relating to the operation and role of the visiting

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teacher service, and, unfortunately in relation to this review, her own work covers only visiting teachers for the hearing-impaired.

According to answers given in Dáil Éireann by the Minister for Education and Science, Batt O'Keeffe, on 29 April, 8 May and 21 May 2008, there are at present 42 posts in the visiting teacher service, some of which are filled on a job-share or part-time basis, giving a total of 45 teachers, 13 of whom are teachers for pupils with a visual impairment. There is no intention at present to expand the service. Of the 13 teachers employed in the academic year 2007/08, 7 have specialist qualifications in visual impairment and 5 have a diploma in special education, but it is not entirely clear whether these two groups overlap, as the Minister also stated that some visiting teachers have more than one specialist qualification. An unspecified number of visiting teachers are at present studying for specialist qualifications.

Table 1: Numbers of students with visual impairment who are enrolled in mainstream and special schools (not specific to visual impairment) in 2007/08.

Mainstream primary schools	Mainstream post-primary schools	Special schools	Total	Source
361	228	191	780	1
230	171	29	430	2

Source 1: Answers given in Dáil Éireann by the Minister for Education and Science, Batt O'Keeffe, on 29 April, 8 May and 21 May 2008. Those figures totalled 880 but also included 100 children of pre-school age and those at college or university.

Source 2: Figures provided by the NCSE, drawing on an administrative database that records the processing of applications for resources to NCSE special educational needs organisers (SENOs).

In 2007/08 these 13 visiting teachers had a total case load of some 880 pupils, as described in table 1, although only 780 pupils are of school age (100 were pre-school or at college or university). However, these figures do not tally with those provided by the NCSE for the same period (only 430 pupils). Feedback from the NCSE suggests that this discrepancy may be because some pupils with visual impairment are recorded

in the SEN category of multiple disability. (The general issue of identifying children with visual impairment is discussed elsewhere in this report).

On average pupils with a visual impairment now receive a visit every six to eight weeks (DES 2008). Services were also provided to pre-school children and their families.

1.3.2 Specialist provision

Before 2002, boys and girls with a visual impairment were educated separately, at least from junior age, with girls being accommodated in St Mary's School for Visually Impaired Girls, Merrion Road, Dublin, and boys at St Joseph's Primary School and Pobalscoil Rosmini, Grace Park Road, Dublin. The Special Education Review Committee (1993) expressed disquiet at the provision for girls of secondary-school age, who, unlike their male peers, did not have access to mainstream provision and the full range of the curriculum.

Since 2002 all specific provision for pupils with a visual impairment has been based at St Joseph's and consists of one primary school and resource centre, one resourced second-level school, a pre-school, a vocational training centre, an assessment service, and a library and centre for producing Braille and large-print books. A recent report by the Association for Higher Education Access and Disability (AHEAD) (2008) questioned the ability of the National Braille Production Centre (NBPC) to cope with the demand for books by second-level students. However, this report was strongly criticised for the methods used to gather information and perceived erroneous statements arising (St Joseph's and NPBI 2008).

St Joseph's provides residential accommodation for students of both primary and secondary age who live too far from the school to attend daily. It has also run summer camps for children with visual impairment.

Linked to this, Rosmini post-primary school was founded by the Rosminian order in 1970 to provide an education for boys from the area and for visually impaired boys of second-level

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age. In 1982 it became a community school,[1] and in 2002 it became co-educational. Pobalscoil Rosmini shares a site with St Joseph's and is resourced to provide for pupils of secondary age with a visual impairment. Such pupils make up about 10% of the pupil population of the school and are supported by resource teachers and a mobility teacher.

1.4 Legislation

1.4.1 Education for Persons with Special Educational Needs Act (2004)

The Education for Persons with Special Educational Needs Act (2004) makes provision for children aged up to eighteen. The definition of SEN given in the act is a "restriction in the capacity of the person to participate in and benefit from education on account of an enduring physical, sensory, mental health or learning disability, or any condition which results in a person learning differently from a person without that condition" (section 1 (1)). The EPSEN Act fits into an existing legislative framework that includes the Education Act (1998), the Education (Welfare) Act (2000), the Equal Status Act (2000–04), and the more recent Disability Act (2005), under the overall provisions of the Constitution of Ireland and various international agreements and human rights provisions (NCSE 2006).

The EPSEN Act makes a number of specific provisions for the education of children with SEN; specifically:

- Children with SEN shall, wherever possible, be educated in an *inclusive environment* with those who do not have such needs, unless this is inconsistent with the best interests of the child or with the effective provision of education for their peers.
- People with SEN have the same right to avail of, and benefit from, *an appropriate education* as their peers who do not have such needs and to leave school with the

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[1] Community schools were established for the first time in Dublin in 1971. George Colley, Minister for Education in 1966, had invited the boards of management of secondary and vocational schools to work in co-operation with each other. Most community schools today have been established as independent entities rather than as a result of the amalgamation of a vocational and a secondary school. They are very much akin to comprehensive schools in their nature but have a different type of board of management. Community schools are responsible for the education of all pupils in their catchment area and for the provision of adult education. They are mostly denominational and co-educational and provide a broad curriculum.

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skills necessary to participate, to the level of their capacity, in an inclusive way in the social and economic activities of society and to live independent and fulfilled lives.

- Parents should have a greater involvement in the education of their children with SEN.

To fulfil the obligations of the act, the National Council for Special Education was formally established in 2005, and its functions are outlined in the act. The NCSE prepared an implementation plan in 2006, setting out the Council's estimate of the resources needed for the implementation of the act, a proposed timetable, and suggestions as to how SEN can be met pending its full implementation. Special educational needs organisers (SENOs) were appointed by the NCSE to perform the functions laid down by the EPSEN. It had been envisaged that all sections of the EPSEN Act would be implemented over a period of five years, beginning on 1 October 2005. However, the implementation of the act has now been deferred until further notice as a result of the budget (October 2008; see Inclusion Ireland 2008; Department of Finance 2009), with the exception of the small number of sections that have already been commenced, most of which refer mainly to the role of the NCSE.

There are a number of implications of the act for children with SEN, which includes children and young people with visual impairment. Following the full implementation and commencement of the EPSEN Act, children with visual impairment will be entitled to

- an assessment to determine if a special educational need exists; this assessment "shall include an evaluation and statement of the nature and extent of the child's disability… and an evaluation and statement of the services which the child will need so as to participate in and benefit from education and generally, to develop his or her potential" (section 4 (6)). The act outlines how assessments will be carried out, the educational resources available, and the provision for appeals.
- a timely assessment that will begin not later than one month after the principal of the school has reached an opinion that the child is not benefiting from the educational programme provided by the school. The assessment will be completed not later than three months after the principal has reached that opinion. In the case of a child who is not a student, the relevant health board will provide the services identified in the assessment as necessary to enable him or her to participate in and benefit from education.

- an individual education plan in EPSEN (IEP) if the assessment establishes that the child has SEN. This will be prepared for the child within one month of receiving the assessment. When preparing or reviewing the IEP, the principal or the SENO will address the provision that needs to be made to assist the student "to continue his or her education or training on becoming an adult" (section 15.1). In the case of a child who is a student, the NCSE will ensure that the services identified in the education plan are provided to enable him or her to participate in and benefit from education.
- a right to appeal decisions regarding educational provision pursuant to the EPSEN Act (2004).

In addition, the act emphasises the importance of

- the co-ordination of health and education in the planning and delivery of services
- transition periods from one setting to another
- all professionals and others working with children and young people with visual impairment being clear on the legislative requirements in relation to the IEP process.

The Implementation Report on the EPSEN Act (NCSE 2006) identifies the policy issues that need to be addressed and actions that need to be taken to ensure that the act is fully implemented. One policy issue to be addressed is that children with special educational needs will have "an enforceable right to an appropriate education in an inclusive setting" (p. 12). Actions that need to be taken include the whole-school planning and delivery of inclusive education; effective teaching of children with SEN in inclusive settings; engagement with parents; SNAs to facilitate the participation of pupils with SEN; assistive technology and transport arrangements; and evaluation of progress and outcomes for pupils with SEN. A particular challenge for the implementation of the act will be the increase in the number of children designated as having SEN, according to the broader definition of this term employed in the legislation.

A recent circular from the DES to primary schools (DES 2007) provided an update on the status of the EPSEN Act (2004) and the Disability Act (2005). The circular clarified that some sections of the EPSEN Act had already commenced and that the remaining sections to be implemented related mainly to the statutory assessment and IEP process. The recent Government decision to defer the commencement of the rest of the act has implications for

the ability of the NCSE to carry out the principles of the act as intended. Policy decisions in relation to funding remain within the remit of the DES, and the NCSE implements resourcing for SEN within limits defined by the DES. The NCSE also has a research and advisory role in relation to the implementation of SEN policy. Therefore, some difficult decisions may need to be made with regard to providing "appropriate" and "inclusive" education.

1.4.2 Disability Act (2005)

The Disability Act (2005) provides a legal framework for the provision of health and education assessment and services to persons with a disability to support them in their school, social, community and home settings. It is part of the National Disability Strategy, which was launched in September 2004. The term "disability" in the act is defined as "a substantial restriction in the capacity of the person to carry on a profession, business or occupation in the State or to participate in social or cultural life in the State by reason of an enduring physical, sensory, mental health or intellectual impairment." "Substantial restriction" is defined as a restriction that "*(a)* is permanent or likely to be permanent, results in a significant difficulty in communication, learning or mobility or in significantly disordered cognitive processes, and *(b)* gives rise to the need for services to be provided continually to the person whether or not a child or, if a person is a child, to the need for services to be provided early in life to ameliorate the disability."

The act enables provision to be made for the assessment of the health and education needs of persons with a disability and to enable Government ministers to make provision, "consistent with the resources available to them," for services to meet those needs. The services include the preparation of plans and other services, such as those provided by a public body that is available to or accessible by the public generally. There is also provision for appeals in relation to the non-provision of services. The act enables "further and better provision" in respect of their use by persons with disabilities of public buildings and of employment in the public service to promote equality and social inclusion.

With respect to children and young people with visual impairment, the implications of the Disability Act include:

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- The right to apply for an assessment of disability, either by the person directly or by a parent or other representative, which must begin within three months and be completed "without delay." This assessment will be carried out by "assessment officers" without regard to the cost of or the capacity to provide any service that is identified in the assessment as being appropriate to meet the needs of the child.

- A copy of the report must be provided to the person who has been assessed. The report must state whether or not the person has a disability, the health and education needs, and the services considered appropriate to meet those needs. The report must also specify the order and duration of the appropriate services and a statement of the period within which a review must be carried out.

- Where an assessment identifies a need for the provision of an education service to the child (a person under the age of eighteen) who is enrolled in a school, the matter is referred to the principal of that school for the purposes of an assessment as a function of the NCSE under the EPSEN (2004).

- In addition to carrying out the functions conferred on it by the EPSEN Act, the NCSE also assists the Health Service Executive (HSE) in the assessment of persons over the age of eighteen, the preparation of "service statements" (section 3 *(a)*), consultation with the HSE and education service providers for the purposes of facilitating the provision of education services, and assessment and review of the resources required in relation to education provision for adults with disabilities.

- There is also a section in the Disability Act relating to the requirement for public bodies, in so far as practicable, to take all reasonable measures to promote and support the employment by it of persons with disabilities (section 47 (1) *(a)*). These measures may include the training or education of persons with disabilities for the purpose of qualifying them for specific posts or employment in the public body.

- The co-operation and effective co-ordination of health and education is essential in the planning and delivery of services for children and young people with visual impairment.

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1.4.3 Sectoral Plan under the Disability Act (2005)

The Sectoral Plan for the Department of Health and Children and the health services (Department of Health and Children 2006) is one of six sectoral plans for provision for persons with disabilities that are part of the National Disability Strategy, launched in September 2004. Chapter 5 of the Sectoral Plan is of most relevance to this review, as it sets out in detail the arrangements proposed for the implementation of part 2 of the Disability Act (2005), which came into effect for children under the age of five on 1 June 2007. Part 2 will be commenced in respect of children aged between five and eighteen in tandem with the implementation of the EPSEN Act (from October 2005). Part 2 provides a statutory entitlement to

- an independent assessment of health and education needs
- a statement of the services to be provided
- the right to pursue a complaint through an independent redress mechanism if there is a failure to provide these entitlements.

The arrangements for the implementation of part 2 of the Disability Act cannot be considered in isolation from the arrangements for the EPSEN Act, as the same health service staff, mainly in the areas of disability and mental health services, will be called upon to provide assessments and services under both acts.

Importantly, however, the responsibility for deciding on educational support and services for individual children and schools rests solely with the NCSE through the appointed SENO. While members of the health staff assess and provide for the health and care needs of children and young people, they have no responsibility for the allocation of educational resources or support. In short, the EPSEN and Disability Acts work together to provide a comprehensive legal framework for the provision of education, health and other services to children with a disability so as to support them in their school, social, community and home settings.

1.4.4 Definition of visual impairment

Douglas and McLinden (2005) describe visual impairment as a broad term that describes a wide continuum of loss in visual function. There are many aspects of visual function, including visual acuity (the ability to resolve detail), accommodation (the ability to focus), field of vision

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(the area that can be seen), colour vision, and adaptability to light. The definition used by the World Health Organisation to describe the degree of visual impairment is based mainly on a *clinical* assessment of the individual's ability to resolve fine detail (i.e. visual acuity), using standardised methods (such as the Snellen chart). A visual acuity of between <6/18 and 3/60 after correction in both eyes is described as *low vision*, and <3/60 as *blind*, although people with better acuity can also be described as having a visual impairment if they show an appreciable loss of visual field. (A visual acuity of 6/18 means that the person can discriminate fine detail at 6 metres that someone with normal vision could discriminate at 18 metres. Similarly, a lower visual acuity of 3/60 means that the person can discriminate fine detail at 3 metres, compared with 60 metres for a person with normal vision.) Importantly, the majority of individuals with a visual impairment, including those classified as "blind", have some residual vision, which can be optimised to enable the person to undertake daily tasks and activities. In the UK the legal terms used to classify visual impairment are *blind* and *partially sighted*, and the legal registration as blind or partially sighted is on grounds similar to (though not exactly the same as) those defined by the WHO. Nevertheless, McLinden and Douglas note that different countries use slightly different definitions: for example, Kakazawa et al. (2000) describe the situation in Japan; Holbrook and Koenig (2000) describe the use of different definitions in different states in the United States.

For those children who have residual vision, it is widely acknowledged that medical descriptions of visual impairment (based on a clinical assessment of visual function) do not provide an accurate indication of how the child is able to use their vision for functional activities, or *functional vision*. For this reason, educational services for visually impaired children will make decisions about services they offer to children based upon *need,* which draws on the *functional implications* of visual impairment as well as clinical assessments. The definition presented by the DES (2002) tends to follow this more "functional" approach, as it refers to a child's "capacity to see" with reference to particular activities.

> Such children have a visual disability which is so serious as to impair significantly their capacity to see, thus interfering with their capacity to perceive visually presented materials such as pictures, diagrams and the written word. Some will have been diagnosed as suffering from conditions such as congenital blindness, cataracts,

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albinism and retinitis pigmentosa. Most require the use of low-vision aids and are availing of the services of a Visiting Teacher. This category is not intended to include those children whose visual difficulties are satisfactorily corrected by the wearing of spectacles and/or contact lenses.

At the interface between health and educational services, the use of both clinical and functional definitions is particularly important. This topic is considered in greater detail in various sections of the review (in particular under "Low vision training") as well as in the final section ("Implications for Ireland") in relation to inter-agency working.

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2. Method

2.1 Overview of approach

The approach to the literature involved the following:

- Agreeing a broad topic framework for the literature
- Applying criteria for the selection of literature
- Stage 1 of the review (initial review of the principal visual impairment literature)
- Appraisal of topic framework based on the findings in stage 1 of the review
- Stage 2 of the review (broader systematic searches of electronic databases).

As described in the tender for the review, the research team took an approach to the literature review that reflected the team's existing knowledge of the research literature in relation to education and visual impairment. For this reason, the team felt it useful to initially divide the literature into distinct areas and within these into topics. While these were not fixed, the initial headings proved helpful in organising the literature. Stage 1 of the reviewing process also had a pragmatic aspect. The team knew that much of the important empirical literature in this field was published in a number of specific specialist journals. The team had access to these journals through its own database, which contained summaries of more than two thousand research articles.

As stage 1 of the review was completed, the team appraised the identified literature in relation to the central purpose of the review (to identify evidence of best practice models and outcomes in the education of blind and visually impaired children). At this point some of the topics of the review were identified as central and were developed further, while others were identified as providing useful context only. These were not taken to stage 2 of the review.

Stage 2 of the reviewing process involved broader systematic searches of electronic databases (such as ERIC) to confirm, add to and (possibly) challenge and "test" the initial analyses. Not surprisingly, stage 2 overlapped considerably with stage 1; nevertheless it did identify some additional useful sources.

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2.2 The nature of evidence in visual impairment education

A number of factors serve as the main drivers in the formulation of educational policy. These include research outcomes and recommendations, government initiatives, and international policies. A focus on the movement towards the educational placement of children with disability in mainstream schools provides a helpful illustration of these drivers. An important driver of these policy developments is the shift towards broad social inclusion throughout society as a whole. This "societal shift" is reflected in (and driven by) government and international policies (for example Irish policies as described above and the "Salamanca statement on special needs education" (UNESCO 1994), respectively). It is often "below" these higher-level policy contexts that educational research operates. Perhaps not surprisingly, therefore, the literature review identified no substantial research in the area of visual impairment education that seeks to empirically compare the efficacy of different broad educational policies (for example those relating to educational placement).

Educational research in the area of visual impairment also appears to have its own traditions. As an example, in a review of pedagogy and visual impairment education Douglas and McLinden (2005) argue that the main research emphasis in the past has been on the concept of "access". The reasons for this seem to be a view that the principal barrier faced by visually impaired people is "access" to visual information. In the context of education, an important role of the teacher is finding appropriate ways of reducing this potential barrier in their teaching. Two significant strategies that have been adopted are the enhancement of visual information and the presentation of visual information in alternative forms (such as auditory or tactual). To this extent an important focus of research literature in this area is on developing and evaluating this broad approach. The implications of this example reveal an implicit assumption of the research design, namely that research in the field generally does not have a comparative design. Researchers and practitioners describe educational approaches they adopt in order to provide visually impaired students with improved access to information. An implicit comparator is that, without the approach, "access" would not be possible (or would be severely compromised).

As illustrated in this review, examples of this type of research form the main basis of the literature. For example, approaches to teaching children areas of the curriculum account for a

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large section of the literature, consisting of case studies describing "modifications" made to materials; research studies report on how ICT is used to gain access to information; the literature in relation to Braille literacy draws mainly on research describing children's reading performance; the literature in relation to mobility and independence assumes that certain skills need to be taught to children as otherwise they will fail to learn these skills. As a consequence, there is limited evidence in the literature about the relative merits of alternative teaching approaches in the form of comparative studies that, for example, investigate whether one type of teaching strategy or placement is more effective than another. This tradition of research is different from that in some other disciplines within special education, in which there is a continuing debate about how best to teach children with given disabilities. The field of autistic-spectrum disorders (ASD) serves as a useful illustration. In that field there are different views about which educational interventions work most effectively with children with ASD (for example PECS and ABA).

An important aim of this literature review is to identify "educational models for blind and visually impaired children that demonstrate evidence-based outcomes for the child." Given that much of the research seeks to demonstrate improved "access" as an essential outcome of an educational intervention, it is this theme that dominates the literature review. The implications of this focus have direct relevance for the structure and findings of the report. The review makes a distinction between a "review context" (concerned with aspects of educational policy, infrastructure, and service delivery) and a "review focus" (concerned with aspects of the child, the classroom, and the curriculum).

The literature associated with the "review context" does not provide *empirical* evidence in relation to the terms of reference of the literature review (i.e. evidence of best practice and outcomes). Nevertheless, we argue that this literature is fundamental in providing a context within which other, more empirical evidence can be understood and applied.

In comparison, the literature associated with the "review focus" provides empirical evidence in relation to curriculum access. As a result, this literature led to the formulation of recommendations that are directly concerned with the teaching approaches and constructs of the curriculum required by children with a visual impairment.

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While the evidence from the literature review gives a clear direction in relation to aspects of classroom practice as well as the design and choice of the curriculum, it provides relatively limited guidance in the way of broader service design and policy. For this reason we present a further analysis at the end of the review in which we apply the findings to the Irish context and offer guidelines.

2.3 Broad topic framework for the literature

The topic framework presented in the proposal (submitted in June 2008) was drawn on as a starting point, with modification and changes in emphasis made as the review progressed (discussed below). The framework divided the literature into three broad themes (and linked sub-topics), which were drawn from general texts in the field of visual impairment and education (e.g. Arter et al. 1999; Douglas and McLinden 2005; Holbrook and Koenig 2000; Koenig and Holbrook 2000; Mason et al. 1997) and the reviewers' interpretation of these. The themes were:

Theme 1: Legislation, policy, and service delivery

Theme 2: Classroom and the curriculum

Theme 3: Additional curriculum needs

The focus of theme 1 (legislation, policy, and service delivery) is on the higher-level policy literature in relation to educational services for visually impaired children. This literature is mainly concerned with the mechanisms that are needed for providing services for visually impaired children. The literature deals with the identification of children, where they are educated, and the training needs of the professionals involved. As will be discussed below, topics in this area were not taken to stage 2 of the literature review.

Themes 2 and 3 are linked to literature that is specifically concerned with children and the curriculum. A distinction is made within this theme between "classroom and the curriculum" and "additional curriculum needs". This distinction is in keeping with the view expressed by many commentators in the literature, who make a distinction between access by visually impaired children to the "mainstream" (or "core") and the "additional" curriculum. This additional curriculum is considered to be either "over and above" the mainstream curriculum

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(e.g. Arter et al. 1999) or areas that are outside the mainstream teacher's expertise (e.g. Spragg and Stone 1997) and therefore require the contribution of professionals with specialist training or knowledge (for example specialist teachers or mobility officer). How curriculum areas are split between the two is debatable (for example, some would place Braille teaching within the additional curriculum, while we have included it as part of "literacy" within the more general curriculum); but the general distinction is useful, in that it helps to structure the report and also reflects traditions in the field of visual impairment education.

Theme 2 (classroom and the curriculum) includes literature in relation to assessing the learning needs of visually impaired children, the teaching strategies whichthat might be adopted to support access to the curriculum, and the broad area of literacy (including Braille).

Theme 3 (additional curriculum needs) includes literature in relation to the areas of mobility and independence, social and emotional inclusion, the use of ICT, and low-vision training.

Another point of debate is the extent to which the additional curriculum can be embedded within the mainstream curriculum. Undoubtedly the mainstream curriculum affords opportunities for this. For example, directions or compass points in geography have relevance to mobility and orientation; elements of physical education are relevant to body image, posture, movement, gait, and general fitness; and aspects of the social, personal and health education (SPHE) curriculum are relevant to social and emotional development. As the literature demonstrates, some elements of the additional curriculum will require individualised instruction, for example long-cane technique (as part of mobility and independence), some parts of Braille teaching, and some parts of low vision training.

2.4 Criteria for selection of literature

In addition to the relevance of the topic, the team used a number of criteria in making a choice of studies reviewed. The literature had to meet at least one of the following criteria:

1. Studies had to be empirically based in some way, that is, based on a formal study that involved the systematic collection of data rather than simply the author's opinion (though data could have included a *collection* of the opinions of, say, a group of professionals).

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2. A number of studies had what one might call an "implicit comparator", for example a study that demonstrated that a child was able to do something that they were unable to do without the intervention in question. These studies may not have involved a controlled experiment where, say, two case studies were compared (i.e. where one child received the intervention while the other did not and the results were compared). Nevertheless they would be studies that could demonstrate a clear "cause and effect", or the impact of something.

3. Weight was given in particular to comparative studies, though only a few of these exist. Where they do exist they are highlighted in that section.

With regard to the balance of material, much of the literature found could be described as "grey literature", in that it often consisted of anecdotal accounts. These have been drawn upon only where other types of literature were not available. Many studies were based on practice, however (often meeting criterion 2 above), while fewer still were what one might call "empirical research papers" (criterion 3 above).

2.5 Stage 1 review

Significant sources of literature in the field of visual impairment and education are relatively limited. Established sources include three international journals: the *British Journal of Visual Impairment* (BJVI), *Journal of Visual Impairment and Blindness* (JVIB), and *RE:view*; relevant professional journals, for example *Visability, New Beacon,* and *Insight*; and the principal textbooks, policy documents, and research reports. Many of these publications are held together in the library of the University of Birmingham. In addition, VICTAR maintains a searchable electronic database that contains more than two thousand article abstracts, including a large number of articles relating to education published in the *BJVI* and *JVIB*.

For this reason the initial literature trawl was undertaken under each of the headings, drawing on these resources, with a particular emphasis on the VICTAR database. Stage 1 of the review involved systematically searching and reading articles and other published materials in relation to each of the framework themes (3) and topics (12). The process led to the development of twelve summary reports (one for each topic).

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At that stage of the review the team appraised the identified literature in relation to the central purpose of the review (to identify evidence of best-practice models and outcomes in the education of blind and visually impaired children). Within this stage some of the topics of the review were identified as central and were developed further, while others were identified as providing useful "context". The themes and topics were therefore split between "review context" (3 themes) and "review focus" (9 topics).

Literature review context

Legislation, policy, and service delivery

- Identifying children with a visual impairment (including those with multiple disabilities and visual impairment)
- Educational placement and models of learning support, including considerations of infrastructure and transitions
- Professional training and development

Literature review focus

Classroom and the curriculum

- Assessment of learning needs
- Pedagogy and teaching strategies for gaining access to the curriculum
- Access to public examinations
- Print literacy
- Braille literacy

Additional curriculum needs

- Mobility and independence
- Social and emotional inclusion
- ICT
- Low-vision training

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2.6 Stage 2 review

The University of Birmingham's e-library service allows access to a number of bibliographic databases with advanced search capabilities. The following databases were individually searched for literature relating to the nine "review focus" topics described above:

1. Dialog DataStar, which included:

    1.1 ERIC: consists of resources in education, including research reports, curriculum and teaching guides, conference papers, and books, as well as a current index to journals in education, which covers published journal literature from hundreds of periodicals; from 1966 onwards.

    1.2 British Educational Index: sources include more than three hundred education and training journals, mostly published in the UK, together with an array of books, reports, series, and other material, including conference papers; from 1975 onwards.

    1.3 Australian Educational Index: consisting of more than 130,000 documents relating to educational research, policy, and practice; from 1979 onwards.

2. CSA Illumina, which included:

    2.1 ASSIA (Applied Social Sciences Index and Abstracts): contains more than 375,000 records from more than five hundred journals published in sixteen countries, covering health, social services, psychology, sociology, economics, politics, race relations, and education; from 1987 onwards.

    2.2 Education—a SAGE Full-Text Collection: includes the full text of thirty-six peer-reviewed journals published by SAGE and participating societies, encompassing more than 45,400 articles on education; from 1965 onwards.

    2.3 Social Services Abstracts: contains abstracts and indexes of more than 1,300 serials, including abstracts of journal articles and dissertations and citations of book reviews on the topics of social work, human services, and related areas, including social welfare, social policy, and community development; from 1979 onwards.

    2.4 Sociological Abstracts: contains abstracts of journal articles and citations to book reviews drawn from more than 1,800 serials, as well as abstracts of books, book

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chapters, dissertations and conference papers in sociology and related disciplines in the social and behavioural sciences; from 1952 onwards.

3. OVID, which included:

3.1 PsycInfo: contains abstracts and citations of literature in the psychological, social, behavioural and health sciences in a number of different topic areas, including education; from 1987 onwards.

The databases were searched only when they were relevant to the topic: for example, the databases relating to social services abstracts were searched only for the topics of "mobility and independence" (as social services would potentially be involved in providing services in this area).

For searching each of the databases, the team decided on search terms for each of the topic areas. The following search terms were used in selecting literature that related to visual impairment *and* children (rather than adults) when searches were conducted for all the topic areas:

To define abstracts relating to children only (the OR Boolean operator was used, as they are alternative terms):

- child / children
- student(s)
- pupil(s)
- pre school
- kindergarten
- youth

To define abstracts relating to visual impairment (the OR Boolean operator was used, as they are alternative terms):

- visual impairment / visually impaired
- partial sight / partially sighted
- low vision
- blind / blindness

- MDVI or multiple disabilities (used only in instances where the literature relating to children with additional disabilities was specifically required)

An asterisk was used for truncation in some of the databases for quicker searching: for example, "visual* impair*" would find instances of "visual impairment" as well as "visually impaired", and "child*" would find articles with "child" and "children" as well as other possible variations of the word.

In addition, the following search terms were used for each individual topic, to ensure that literature was found that related to children AND (Boolean operator) visual impairment AND (Boolean operator) the topic, whereas before the OR operator was used in each case between all the topic's search terms, as they are alternative terms. The number of abstracts relevant to each topic is also shown following the topic title:

Assessment of learning needs (*n* = 52):

- touch
- assessment procedures
- assessment tool(s)
- tactile assessment
- visual function / visual functioning
- cognitive function / cognitive functioning

Pedagogy and teaching strategies for obtaining access to the curriculum (*n* = 58):

- teaching strategy
- teaching approach
- pedagogy

Access to public examinations (*n* = 52):

- exam / examination
- assessment accommodation
- access arrangements

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Literacy, including Braille and print (n = 267):

- literacy
- reading
- Braille

Mobility and independence (n = 68):

- mobility
- independence
- ILS
- independent living skills
- daily living
- orientation
- O&M
- M&I

Social and emotional inclusion (n = 147):

- social
- emotional
- psychological impact
- assertiveness
- interpersonal
- friendship(s)
- self concept
- self worth

ICT (n = 29):

- computer
- ICT
- Internet

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Low-vision training (*n* = 42):

- low vision therapy
- low vision device / LVD
- low vision aid / LVA
- visual skills

In most cases, these searches produced a large number of references. Those that were confirmed as being of relevance were exported to an on-line research management, writing and collaboration tool (RefWorks), designed to help researchers to manage, store and share references as well as to generate citations and bibliographies. From this database the team reviewed the additional references generated and made use of them where appropriate when reviewing and further developing the sections that were created in stage 1, as described earlier.

2.7 Overview of review structure

The findings and implications of the review are split into separate sections to reflect the themes identified above:

- Literature review context: Theme 1: Legislation, policy and service delivery (section 3)
- Literature review focus: Theme 2: Classroom and curriculum (section 4)
- Literature review focus: Theme 3: Additional curriculum (section 5)
- Consideration of implications for Ireland (section 6).

Where relevant, "Key findings", "Recommendations" or "Implications for Ireland" are presented at the end of each section, with a summary provided in the Executive Summary.

The review context (section 3) presents literature that is relevant to the aims of the literature review. It does not, however, contain studies that provide *empirical* evidence to identify "educational models for blind and visually impaired children that demonstrate evidence based outcomes for the child" (i.e. that are not directly linked to the aims of the review set out by the NCSE).

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The review focus (sections 4 and 5) generated a much richer source of empirical evidence in relation to the aims of the literature review, and for this reason the sections conclude with evidence-based recommendations.

Section 6 then synthesises the themes from the review and considers these with regard to Ireland. This section presents "Implications for Ireland", which are the review team's suggestions for how the review findings can be applied in Ireland.

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3. Review Context: Legislation, Policy and Service Delivery

3.1 Introduction

This section is structured under three headings to reflect the main strands of the literature in this area. Each of the sections concludes with a list of key findings.

- Identifying children with a visual impairment (3.2)
- Educational placement and models of learning support, including considerations of infrastructure and transitions (3.3)
- Professional training (teacher education) (3.4)

3.2 Identification of visually impaired children

The focus of the commissioned literature review is not on the incidence of visual impairment in Ireland. Nevertheless, the identification of visually impaired children is a critical part of the process of providing an appropriate education for them. For this reason the review team carried out a short review of recent literature on the nature of the visually impaired population. There appears to be no detailed study of this population in Ireland (with the exception of one study in Northern Ireland), and for this reason we have focused on the UK (and particularly Scotland) as a useful point of reference.

3.2.1 Definitions and prevalence

Douglas and McLinden (2005) describe visual impairment as a broad term that covers a wide continuum of loss in visual function. There are many aspects of visual function, including visual acuity (the ability to resolve detail), accommodation (the ability to focus), field of vision (the area that can be seen), colour vision, and adaptability to light. It follows, therefore, that there are many causes, types and severities of visual impairment. The definition used by the World Health Organisation in describing the degree of visual impairment is based mainly on an assessment of the individual's ability to resolve fine detail (i.e. visual acuity), using standardised methods (such as the Snellen chart). A visual acuity of between <6/18 and 3/60 after correction in both eyes is described as low vision and <3/60 as blind, although people with better acuity can also be described as having a visual impairment if they show an

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appreciable loss of visual field. Even so, Tate et al. (2006) note that, though visual acuity of <6/12 is not used internationally to define impairment, it is reported in some studies, as it represents a reduction in visual acuity sufficient to affect life-style (for example, it corresponds to the requirements for sight for the UK driving licence). Tate et al. (2006) also note that data on the causes of poor acuity provides important information for policy and service provision. Among children, a commonly used criterion is sufficient visual loss for a child to be identified as being in need of special educational resources or the involvement of social services departments.

In their recent study, Tate et al. (2006) report that most of the available data in the UK about visual loss in children comes from registers or from surveys of providers of health care, social care or educational services to children with visual loss. This data has been collected through epidemiological studies (e.g. Rahi and Cable 2003), social surveys (e.g. Bone and Meltzer 1989), and national surveys of local authority visual impairment advisory services (e.g. Clunies-Ross 1997; Keil 2002). The government also collects statistics on different special educational needs groups as part of its Annual Schools Census in England and Wales (similar to figures collected by the NCSE).

The review revealed a lack of agreed definitions of visual impairment among children, with such terms as "visual impairment" and "visual disability" being used to mean different things in different studies and contexts. The finding was supported by a national study of children with a visual impairment in the UK (Clunies-Ross 1997), where it was noted that there were no "universally adopted criteria" for recording data on the children's visual impairment.

With regard to prevalence, drawing on "a broad and pragmatic definition of visual loss" (taken to mean that a child is identified as being in need of special educational or social services), Tate et al. (2006) note that the existing data suggests a prevalence of visual impairment in the region of 10–20 per 10,000 children in the UK. This contrasts with slightly higher estimates based on the number of children receiving educational support in relation to visual impairment in the UK: 2.4 children per 1,000 (Keil 2002). Indeed the most recent survey commissioned by the RNIB suggests even higher numbers. A study in Northern Ireland by Flanagan et al. (2003) estimated 1.6 children per 1,000.

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The literature described above shows that in the UK there are mismatches between estimates of children based on epidemiological studies and the number who require educational support in relation to their visual impairment. Most probably the reason for this is the difference in definitions adopted in the various studies and services. An approach that is relevant here is reported by Ravenscroft et al. (2008). They report on a "novel" method of notification to profile childhood visual impairment in Scotland (and drawing on practice in Scandinavia). Crucially, the method draws on information provided by parents, teachers, and health professionals. While the authors note that the study and service they describe is not an epidemiological one, it does (or will in time) identify all the children with visual impairment in Scotland:

> It should be stressed that this study should not be regarded as a true epidemiological investigation into childhood visual impairment in Scotland. It is not. It does not follow the true scientific rules of epidemiology, nor does it follow the scientific method of epidemiological capture. However, what this study does provide is a profile (using data from existing medical records) of children with VI living in Scotland which has been obtained using a unique method of notification. (p. 185)

In Scotland (as in the rest of the UK) an ophthalmologist can assess whether a person can "register" as either "sight-impaired" (partially sighted) or "severely sight-impaired" (blind). If the visual impairment is of sufficient severity (and with the agreement of the visually impaired person or their carer) the ophthalmologist will complete a "certificate of vision impairment" and send it to the person's local social services department. The social services department will contact the visually impaired person to assess whether they require any services. It is the social services department's responsibility to maintain the registers of visually impaired people. In response to a belief that the registration process was not adequately identifying children with visual impairment, the project team created a new (parallel) service of "notification", which brought together data from different sources into a coherent "whole". They did this by distributing leaflets explaining the purpose of the study, consent forms and parental notification documents to orthoptists, ophthalmologists, paediatricians, teachers, social workers and voluntary organisations throughout Scotland, who in turn distributed them to their patients or clients. When a completed consent and notification form was returned from a parent, structured medical data collection forms were sent to the child's family doctor,

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eye department, and community paediatrician. The resulting database and network of children and families was found to include many children who had not been previously registered as visually impaired and therefore may not have had access to services. Arguably, the database can serve to connect different stakeholders and give policy-makers critical data needed for planning services.

> Finally, policy makers and planners of integrated medical, educational and social services aiming to meet the needs of children with special needs, and in particular those with visual impairment, face the difficult task of delivering services based on information that may not describe the full scale or spectrum of children to be served. This study, by linking a relevant and tailored user-driven information and support service to a broad base of notifying professionals (ophthalmologists, optometrists, orthoptists, paediatricians, teachers and social workers) has developed an inclusive system of notification of a low incidence childhood disability. Over time such a system may well identify the majority of children with visual impairment. The information gained from this new system highlights the complex needs of children with visual impairment and can be used to inform appropriate planning of service provision. (p. 186)

3.2.2 Children with visual impairments and additional disabilities

The literature provides clearer conclusions that high proportions of visually impaired children have disabilities in addition to their visual impairment. As an example, a study by Rahi and Cable (2003) reported that the characteristics of the population of children with severe sight problems or blindness are changing. The reasons cited include the fact that there has been a decline in the incidence of treatable or preventable disorders such as retinopathy of prematurity and congenital cataract and an increase in untreatable disorders, such as cerebral sight problems, the inherited retinal dystrophies, optic nerve atrophy, and hypoplasia. This increase is linked to changing trends in childhood chronic disease and disability that are themselves linked to an increased survival of premature and very low birth weight babies and children with major anomalies, complex neurological and metabolic diseases, and malignant disease. The authors also report that children with the most severe visual impairments were more likely to have additional and often very complex disabilities. There is an increased rate

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of severe sight problems and blindness in children from ethnic minorities. The researchers note that their finding of a higher than expected proportion of children with additional disabilities partly reflects the changing nature of the population but also suggests that studies that rely on ophthalmic sources alone under-represent the number of children with additional disabilities.

Keil (2002) estimated that 50% of visually impaired children between 0 and 16 years of age have disabilities in addition to their visual impairment. This was divided between children with a "visual impairment and additional disabilities" and those described as having multiple disabilities and visual impairment (MDVI). Children with additional disabilities (accounting for approximately 18% of the visually impaired population) were described as having sensory, physical or mild to moderate learning difficulties (but excluding severe or profound learning difficulties) and being broadly within the usual developmental range for their age. Children defined as MDVI (accounting for approximately 30% of the visually impaired population) were described as having multiple difficulties, which included severe or profound learning difficulties, and who were functioning at early, or very early, stages of development. In an earlier British study Walker et al. (1992) found that the proportion of children with additional disabilities was greater for those who were blind (i.e. with more severe visual impairment). Ravenscroft et al. (2008) report that an even higher proportion of children (71%) "also suffer from additional disabilities (in addition to their visual impairment)" (p. 183). The study by Flanagan et al. (2003) in Northern Ireland found that 79% of their sample had "additional medical problems" (p. 493).

In Ireland the recent National Disability Survey (NDS) drew on a sample identified as being disabled in the 2006 census (CSO 2008). "Seeing disability" was one of the disability types included in this research. Combining the census and NDS data provides an opportunity to generate population estimates. Further analysis cross-tabulating age and different disability groups would also give estimates of the numbers of school-age children with additional and multiple disabilities as well as visual impairment.

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3.2.3 Summary

There appears to be no detailed study of the visually impaired school-age population in Ireland (although the recent National Disability Survey provides data, and a secondary data analysis would most probably provide some details of the population characteristics). For this reason the main focus of this review has been on the UK (and particularly Scotland) as a useful point of reference.

There is no universally adopted definition of visual impairment in the literature relating to children. This presents particular challenges in making comparisons between national prevalence studies. As an example, in relation to the UK, while there are no consistent estimates of the prevalence of severe sight problems in children aged up to sixteen, the figure is likely to be between 10 and 20 per 10,000. Surveys of local authorities in the UK that suggest a prevalence of up to 24 children per 10,000 may include children with less severe visual impairments.

Importantly, the literature provides clear evidence that a significant proportion (more than half) of visually impaired children have disabilities in addition to their visual impairment—in many instances multiple difficulties, which include severe or profound learning difficulties.

This issue is revisited in the final discussion and implications section. Nevertheless, clear mechanisms for identifying children and referring them to relevant educational agencies are a critical part of any educational service for visually impaired children, in Ireland as elsewhere. Recent developments in Scotland offer a contemporary and interesting model of how health and educational services can be connected to better ensure that visually impaired children become known to the educational services.

3.2.4 Key findings: Identification of visually impaired children

- There appears to be no detailed study of the visually impaired population in Ireland.
- In relation to the UK, while there are no consistent estimates of the prevalence of severe sight problems in children aged up to sixteen (partly because of inconsistent use of definitions), the figure is likely to be between 10 and 20 per 10,000.

- There is clear evidence that a significant proportion (more than half) of visually impaired children have disabilities in addition to their visual impairment, in many instances multiple difficulties, which include severe or profound learning difficulties.

3.3 Educational placement and models of learning support

Evidence in this area consists predominantly of "grey literature"—a combination of legislation, policy reports and guidance, reports of NGOs and charities, and "expert" position statements. While various governments have shown a strong commitment to the educational inclusion of visually impaired children, there is a marked absence of empirical studies comparing the relative effectiveness of different types of educational placement or learning support for visually impaired children.

The sources on placement and learning support reflect "expert views" (e.g. Curry and Hatlen 1987; Lomas and Mumford 1994), case studies of individuals (e.g. Jamieson et al. 1977; Erhardt 1987), and surveys and evaluations of service provision (e.g. Morse 1983; Franklin et al. 2001).

The topic can be divided under the following broad headings:

1. Legal frameworks or Education Acts (a brief overview of the main legislation trends in the UK and the United States)
2. Placement and learning support (strategic planning)
3. National and regional provision (including the role of special schools)
4. Learning support in school: Views of parents and children
5. Learning support in school: Role of the teaching assistant

3.3.1 Legal frameworks, Education Acts and policy relating to placement and support for visually impaired children

UK context

In 1968 the British Government established an inquiry into education for children with visual impairment. The subsequent report, *Education of the Visually Handicapped* (Department of Education and Science 1972), is also known as the Vernon Report, after its chairperson. The

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report recommended that blind and partially sighted children would benefit from being educated in the same schools but, significantly, also supported the general concept of the "integration" of children with visual impairment in mainstream schools. The Warnock Report (Department of Education and Science 1978) and the subsequent Education Act (1981) (Department of Education and Science 1981) consolidated the right of children with "special educational needs" (SEN) to placement in the local school, subject to such considerations as the "efficient use of resources".

Consequently, the decade 1970–1980 saw a steep rise in the number of local education authority (LEA) services for children with visual impairment and an increase in the education of children with visual impairment (especially those who were "partially sighted") in local schools, supported by a visiting or "peripatetic" qualified teacher of the visually impaired. As alternative mainstream options for placement opened up, enrolment in schools for the partially sighted fell, and many of these schools closed or changed their designation to include users of both print and Braille. Special schools for the blind, now beginning to provide instruction in both print and Braille, were also experiencing falling enrolment and began to comprise a wider range of ability, including children with more complex needs (McCall 1997).

The Code of Practice for SEN (Department for Education 1994) accepted that the needs of most children with SEN could be met within mainstream schools but took a moderate stance on inclusion by emphasising the importance of maintaining a continuum of provision for a continuum of needs (Hornby 1999). By 2000, however, the educational "inclusion" of children with visual impairment in mainstream schools had become well established in policy and practice. Legislation continued to strengthen the right in law of the child with SEN to education in local schools. For example, the Special Educational Needs and Disability Act (2001) (SENDA 2001) applied the Disability Discrimination Act to schools, confirming the right of disabled students not to be discriminated against in education.

The effects of these policy and legislative changes on educational placement for children with visual impairment were evident in the results of a survey by Keil and Clunies-Ross (2003, p. 16). The extrapolated figures for England, Scotland and Wales suggested that by 2002, 57% of 5 to 10-year-olds and 47% of 11 to 16-year-olds with visual impairment were educated in their

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local mainstream schools. In both age ranges, fewer than 1% of children with visual impairment were educated in specialist schools for children with visual impairment. 80% of blind children using Braille were being educated in mainstream education, either at a local school supported by a QTVI or at a mainstream school specially resourced for visually impaired children.

However, the survey also revealed that children with multiple disabilities and visual impairment (MDVI) were still most likely to receive their education in generic (i.e. non-visual-impairment) special schools. Porter and Lacey (2008) recently analysed the match of children's needs against placement in the context of the increasing use of non-visual-impairment designated and non-specialist forms of provision for children with MDVI. They expressed concern and concluded that local authorities needed to be more strategic in their approach to the placement of children and should seek to ensure that children with MDVI in generic special schools had access to staff with specialist training.

US context

A theme running through the national legislation from the 1990s onwards in the United States was the drive to educate pupils with disabilities in the "least restrictive environment" (Head 1990). In relation to visually impaired children, Bishop (1990) argued that placement decisions should be made as a result of a careful analysis of all factors relating to the child and, significantly, an exploration of all possible placement options on "the complete continuum of service delivery models".

Head (1990) offered a summary of issues current at the time regarding the establishment of service criteria for visually impaired children and expressed concern about the emphasis on placement issues rather than on service delivery issues. Head also questioned the concept of an "educational deficit" as an appropriate criterion for service delivery.

Schroeder and Richert (2003) set out recommendations to Congress in relation to the legislation they felt was necessary regarding the provision of high-quality education for students with visual impairment. These recommendations can be seen in the context of the impending Individuals with Disabilities Education Act (2004). Part B of this act governed the

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provision of early intervention, special education and related services to children with disabilities by states and public agencies.

Schroeder and Richert recommended that Congress should

- ensure that blind or visually impaired students are provided with access to classroom instructional materials and technology equal to those of their non-disabled classmates
- require that assessments of students with visual impairments are designed with sensitivity to their unique needs, are administered by personnel with knowledge of those needs, and are provided in individually appropriate reading media
- dramatically increase the availability of teachers and related services personnel trained to meet the unique needs of students who are blind or visually impaired
- provide for a complete and accurate identification of students with visual impairments in need of special education and related services
- address the need for a full range of appropriate transition services, ensuring successful progress from school to work
- guarantee the placement of students with visual impairments in educational settings in accordance with individual students' needs.

The American Foundation of the Blind (2007) subsequently published a position paper on the inclusion of students with visual impairments, concluding that "students who are visually impaired are most likely to succeed in educational systems where appropriate instruction and services are provided in a full array of program options by staff qualified to address each student's unique educational needs," and they argued that this was a legal requirement of the Individuals with Disabilities Education Act.

The AFB reaffirmed its view that visually impaired children have unique educational needs that are most effectively met through a range of programme options and specialised support services. It saw access to materials in appropriate media and to specialised equipment and technology as requisites for ensuring equal access to the core and specialised curricula and argued for adequate personnel preparation programmes and continuing in-service training for staff members to meet the specialist curriculum needs of students with visual impairments. Specialised parent education was also seen as an essential element of training provision.

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Some influential professionals continued to express disquiet about equating the "least restrictive environment" with the local mainstream school. For example, Curry and Hatlen (2007) argued that such a requirement can overshadow the need to place the children in an environment where all their educational needs are met, and they proposed that the appropriate placement of children with visual impairment should be dependent on a thorough assessment of the student in all areas of potential need and a determination of that student's instructional needs as well as the preparation of goals and objectives to meet those needs.

Summary

In both the UK and the United States legislation has consistently supported the right of children with visual impairment to education in mainstream settings. The great majority of visually impaired children with no additional disabilities are now placed in mainstream schools. In the UK, however, children with visual impairment and severe additional disabilities for the most part continue to receive their education in special schools not designated for visually impaired children. In the United States many educationalists in the field of visual impairment have advocated the continuation of a range of options for school placement supported by specialist services.

3.3.2 Learning support (strategic approaches)

An early study on the integration of children with visual impairment in the UK (Jamieson, Parlett and Pocklington 1977) recommended a research approach for assessing learning support in which hard, quantitative data is given less prominence than data obtained from qualitative approaches, such as naturalistic observation and interviews. The study recommended the process of uncovering and analysing the "real" situation in all its complexity and with all its contradictions, underlying assumptions, and modes of operation, and indeed much of the later research into learning support adopted this approach (e.g. Dawkins 1991; Dobbins and de la Mere 1993).

Dawkins (1989) produced a report for the RNIB, *Bright Horizons*, providing guidance for local education authorities on developing a new service or extending an existing visual impairment service. The report advised on the types of school placement that should be available and

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offered questions to establish whether a placement is appropriate. Dawkins distinguished between mainstream with little or no support, mainstream with individual support, and a resource base in mainstream, and offered advice about choosing a residential special school (where this was considered appropriate). She stressed the importance of adequate funding, appropriate training for staff members, access to appropriate equipment and materials, and full access to the mainstream and the additional curriculum.

In 1991 Dawkins produced a series of case studies of practice in a range of different types of LEA, including urban and rural services and new and established services (Dawkins 1991). She described and evaluated a range of provision, including a county service evolved from a special school for the visually impaired. She also studied the experiences of a range of children within these services and provided a commentary on the studies, drawing out guidelines for service development, covering pre-school, school-age and post-school provision. She stressed the importance of planning, warning that it "often happens" (p. 198) that an LEA will appoint a specialist teacher to establish the service and then allow it to grow "under its own momentum," arguing that a more long-term "blueprint" is needed so that the growth of the service can be managed effectively.

Dobbins and de la Mere (1993) provided a rare example of an attempt to assess the "efficacy" of learning support for visually impaired children. The authors suggested that the results of the research, while on too small a scale to be conclusive, indicated that the special education provision available to visually impaired children in mainstream primary schools compensates only in some cases for visual loss. The research was undertaken between 1991 and 1992 and was based on video recordings of lesson tasks undertaken by fourteen children from three local education authorities in Wales. The article concluded with a list of options used by the teachers of these children for removing or reducing the "visually based problems" inherent in lesson tasks relevant to the National Curriculum.

However, much of the literature relating to "best practice" in learning support expresses "expert views" rather than research findings. For example, Tobin and Pitchers (1994) provided draft guidelines for bodies responsible for the provision of "high-quality" education for children with visual impairment in the UK. They described the essential requirements for high-quality education as:

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- effective systems for identifying and supporting children and their families before school age
- systems and staffing to ensure that children of school age have full access to the National Curriculum and additional input in such areas as mobility and Braille, adaptive technology, etc.
- access to appropriate equipment
- access to trained teachers and support staff
- effective procedures for quality assurance.

Further, they argued for an independent assessment body to monitor quality and worked with an LEA to set out the full costings to the authority of placing a blind child in a local mainstream day school. The results suggested that providing high-quality learning support locally was not a cheaper option than placement at a residential special school (Tobin and Pitchers 1994).

At about the same time the North-West Support Services for the Visually Impaired drew up guidelines for maintaining "the educational entitlement of all pupils who are visually impaired" (North-West Support Services for the Visually Impaired 1994). The guidelines emphasised the importance of effective identification, assessment and intervention from pre-school onwards and access on equal terms to all curriculum experiences and opportunities, defining the additional needs of children with visual impairment as training in daily living skills, orientation and mobility, the use of residual vision or other senses, and opportunities for social and emotional development and for career and vocational studies.

A position paper, "Delivering Quality Education Services to Children and Young People with VI", was drawn up by a selection of experienced educators representing the range of provision for visually impaired children in England (Raybould et al. 1997). The group included heads of special schools, heads of LEA services, and teacher trainers. Underlying their proposals was a belief that visual impairment creates a unique set of needs that require specialist intervention and that there was a need for a diversity of funded provision, including mainstream and specialist provision working in collaboration. The paper defined four models of service:

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- Historical collection: The system evolves without central planning in response to perceived local, regional and national needs. There is some interaction, but each element operates independently, resulting in patchy and inconsistent provision.

- Collaborative model: Collaboration between institutions to serve mutual interests. It is often driven by institutional self-interest rather than the needs of the child. Collaboration is often ephemeral.

- Unified model: Services are run by national or regional organisations funded by central government. It allows for confident long-term financial planning, but there is a danger of inertia in funded services. It needs effective quality assurance.

- Co-ordinated model: An array of interlocking and interdependent services within a region. Based on regional funding and driven by contracts, the co-ordinated model would offer a network of services. Each element would build on its existing portfolio of services or change and develop new areas of specialism to plug gaps in the network.

The group recommended the "co-ordinated model" as the best option.

The "National Agenda" (Corn et al. 1995) is an American example of a position statement relating to learning support by a cross-section of expert individuals, including educators, teacher trainers, administrators, parents, and people with visual impairment. The booklet sets out eight goals, related to referral, the provision of educational services, participation by parents, preparation of personnel, assessment, an array of services, and access to instructional materials and the core curriculum. It argued strongly that the heterogeneous nature of the population of visually impaired children requires a range of "placement options", including such options as "specialised schools, resource room programmes, and regular education placement with itinerant services" (i.e. visiting teacher services) (Corn et al. 1995, p. 11).

In an example of an expert view on learning support for children in the UK, Crews (1999) discusses how to "ensure the best" for children with visual impairment. Important factors for successful inclusion that are emphasised are:

- the "ethos" of the school chosen to receive a visually impaired child: this needs to be supportive and inclusive of the visually impaired pupil and their family, and Crews

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argues for a qualified teacher of the visually impaired as an essential resource for the school

- acceptance of the fact that pupils with visual impairment will need a regular assessment of their needs, for these needs will change at different phases of their school life

- opportunities for "active participation", with the visually impaired child given the chance to be involved in class activities wherever possible.

In 2002 a set of "Quality Standards in Education Support Services for Children and Young People with Visual Impairment" was published by the UK government (Department for Education and Skills 2002). The standards were not considered to be mandatory but rather set out "markers" for LEAs when reviewing their learning support. Standards were defined for assessment, early-years provision, school years, beyond school, and management and leadership. In relation to educational placement the document recommended that all children with visual impairment should be "given the opportunity to attend a mainstream playgroup and/or nursery as appropriate," with opportunities provided for parents and carers to discuss "the full range and type of educational provision" and to visit "a range of alternatives to make an informed decision" (DfES 2002, p. 7). Further, the document defined the range of support that should be available from visual impairment support services, including both individual tuition and teaching in specialist curriculum areas, for example Braille, mobility and daily living skills, from appropriate staff members.

A research study by Davis and Hopwood (2002) funded by the ESRC looked at the inclusion of children with visual impairment in seventeen mainstream primary school classrooms. Case study methods included classroom observation and interviews with staff members who directly affected the quality of children's inclusion in the classroom, such as the teaching assistant, class teacher, and specialist visiting teachers, as well as with others. A number of factors emerged that overcame barriers to the participation and learning of children with visual impairment, including the provision of adequate additional support, inclusion in the main learning processes taking place in the classroom, and good communication between members of the teaching team.

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In 2006 a national audit of support services and provision for children with low-incidence needs (Gray 2006) was commissioned by the DfES to examine how local authorities meet the needs of such children (who include children with severe sensory impairment) and to identify gaps in services as well as elements of good practice. The survey was designed to inform DfES policy and practice and the proposed development of "Regional Centres of Expertise". The audit confirmed that most LAs seek to maintain a continuum of provision (education support teams and mainstream, unit or special school provision), and most make use of provision outside their area. It noted particular difficulties in provision for children with the most complex needs, which spanned a range of dimensions. It noted gaps in family support and short-break respite care as a major reason for parents opting for placements away from home and found a general lack of opportunities for extended day or social and leisure opportunities.

The report recommended the mapping of existing expertise and its dissemination through more effective processes of local, sub-regional and regional planning. The audit drew attention to the work of the South-East Region in the area of sensory impairment. While the audit found little support for the concept of "Regional Centres of Expertise" with regard to specialist provision for children, it did find support for improved regional and sub-regional planning and review to ensure that specialist skills continue to be available locally and to allow for the sufficient recruitment and training of specialist staff. It concluded that there was a continuing place for direct specialist service provision but recommended that such provision should always seek to extend good practice to a wider range of providers.

The most recent overview of learning support for visually impaired children in Britain is a report by the National Foundation for Educational Research commissioned by the RNIB and provided by Morris and Smith (2008). In 2007 they carried out an on-line survey of local authorities in England, Scotland, and Wales, achieving a response rate of 77% from local authorities in England (i.e. 100 of 130). The survey sought data on the numbers and characteristics of children and young people with visual impairment, sought to identify and map the type of educational and other provision provided, and sought to explore how and to what extent such provision is supported both professionally and through ongoing training for staff members.

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The findings confirmed that the great majority of visually impaired children receive their education within their local authority area (only between 3 and 4.5% of children in Great Britain are educated in neighbouring or other authorities). Of the children educated outside their authorities, 69% had additional disabilities. Overall only 7% of the 10,314 pupils were in special schools for children with visual impairment or in mainstream schools specifically resourced for visual impairment.

The visual impairment service in most LAs appeared to be managed within a broader service, either an SEN service (31%) or a sensory service (33%). The majority of visual impairment services (68%) were organised as a single service covering the whole local authority area, rather than being organised geographically or as a consortium servicing a number of adjoining local authority areas. It appeared that the average time allocation for management of the visual impairment service was less than one full-time equivalent (FTE) post, i.e. 0.89 FTE. Few services, however, reported that they had unfilled vacancies for specialist teaching posts.

The funding of visual impairment services in most LAs (68%) was provided centrally rather than delegated to individual schools. In relation to additionally resourced schools, two models of funding were reported, with slightly more funded and managed by the host school than by the visual impairment service.

In spite of the complex systems for delivering support that were reported, it is notable that only half the visual impairment services said that they carried out any type of evaluation of the impact of the services they provided.

Morris and Smith also reported that the duties of staff members in visual impairment services varied widely, with many having broad responsibilities relating to generic special needs (especially hearing impairment) in addition to more specific responsibilities relating to visual impairment. As a result it was difficult to obtain a national picture of staffing levels and the roles and qualifications of staff members in services for visually impaired children. Nevertheless they calculated the mean number of visual impairment advisory teachers within any one visual impairment service to be 4.17, though many of these posts were only part-time.

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There are generally very few attempts in the literature to quantify the support required by children with a visual impairment. Most sources identify the type of support required at the service level but do not attempt to specify what is needed at the level of the child. However, the South-East Region Special Educational Needs (SERSEN) partnership, referred to earlier, did publish eligibility criteria, designed to help quantify the learning support required by individual children with sensory impairment (SERSEN 2008). The scoring system used was based on a number of factors, including the severity of sensory loss, additional impairments, the learning environment, and the need for specialist training in such areas as mobility. SERSEN suggested that the criteria could be useful in assisting heads of service in making the case for determining and maintaining suitable levels of support to families and schools, for example the number of visits per week by visiting teachers, and the degree of additional in-class support required, for example from teaching assistants.

Summary

There is limited empirical data to demonstrate the relative effectiveness of different models of educational support for visually impaired children, and the main body of evidence for the best options regarding educational placement and models of support comes from "expert views" or surveys of existing practice.

A range of national models has been proposed for the provision of learning support to visually impaired children. There has been a strong belief among professionals in the field that the heterogeneous population of visually impaired children requires a range of support options to meet its needs. Recommendations about the learning support framework required have a fair degree of consensus: effective provision for identification and assessment (e.g. Tobin and Pitchers 1994; Corn et al. 1995), appropriate training for staff members (various sources), access to both mainstream and additional curricula (e.g. NW Support Services 1994), participation by parents (various sources), and access to specialised resources (e.g. Corn et al. 1995).

There is consistent agreement that multi-agency working is an essential feature of effective support. The low-incidence nature of visual impairment in children means that services have to work closely together to identify, assess and support these children. A range of national

standards has been proposed for monitoring the provisiondelivery of services by agencies responsible for providing learning support to children with visual impairment in both the UK and the United States (DfES 2002; Corn et al. 1995).

Almost all visually impaired children in the UK are educated within their local authority area and are supported by a local specialist visual impairment team, which may be part of a larger SEN support service. While there is a range of sources that attempt to describe the model or type of support required within a service, there is little attempt to quantify the support required at the level of the child.

3.3.3 National and regional provision (including the role of special schools)

As in the section above, much of the UK source material in this area is "grey literature", concerned with policy initiatives and expert views of what constitutes an appropriate array of provision for children with visual impairment. As noted earlier, the Vernon Report was the first serious attempt at national planning relating to provision for children with visual impairment. It made a number of recommendations for rationalising the existing provision of special schools to take account of regional needs, but very few of these recommendations came to fruition. Since then there have been a number of initiatives aimed at developing regional co-ordination in the provision for visually impaired children.

The report of an RNIB working party in 1998 argued for the regional co-ordination of provision for children with sensory impairment, recommending a framework of national standards for provision for these "low-incidence" disabilities (RNIB-DfEE 1998, p. 28). A Green Paper (Department for Education and Employment 1997) recommended the strengthening of regional provision in special-needs education. It was envisaged by agencies that this would allow each region to establish a coherent framework, with clear mechanisms for the allocation of funding. Regional co-ordination committees could plan services incorporating existing visual-impairment special schools and visiting teacher services to form a continuum of provision that could operate in a multi-disciplinary environment with health and social services. The benefits were seen as economies of scale and better co-operation, resulting in improvements in such areas as the identification, assessment and placement of children. Three years later, however, McCall (2000) expressed disappointment that the

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proposals had been implemented on only a very modest scale and had had "little impact in most parts of the country" (p. 120) in promoting collaboration between local authorities or between visiting teacher services and special schools.

Nevertheless, a central theme running through the UK literature on the role of special schools during this period is the potential role of designated special schools for the visually impaired in regional or national provision.

In 1995 a paper called "Developing the Roles of Special Schools and Colleges for the VI in the 21st Century" was published by the Association of Heads of Schools and Colleges for the Visually Impaired (Smith et al. 1995). The paper sought to identify the critical factors affecting special schools and to consider their future roles. A central argument was that special schools had a local, regional and national leadership role to play in such areas as training, innovative teaching and curriculum development, and the establishment of benchmark standards for the specialist expertise and resourcing needed for visually impaired children. Among the threats identified was the lack of consistency in funding arrangements for special schools, and it was proposed that a national formula for the funding of visually impaired children should be developed that would be "needs-led". The paper argued for an extended role for special schools to recognise their contribution to the field in such areas as teacher training (for example through teaching placements, visits, and informal advice to mainstream schools) and in modifications to examination papers for examination boards.

Talbot and Farbey (1997) argued that the non-maintained special schools for the visually impaired and local education authority support services had not been working together as efficiently as they might. They outlined a new role for the non-maintained special school and suggested how it might work more closely with LEAs.

The UK Government published a strategic document, "Removing Barriers to Education" (Department for Education and Skills 2004) that set out its strategy for SEN as part of the reform of children's services laid out in *Every Child Matters* (DfES 2003). In relation to the role of special schools it noted that "special schools have an important role to play within the overall spectrum of provision for children with SEN," both by "educating some children directly" and by "sharing their expertise with mainstream schools to support greater inclusion" (p. 34). The strategy was to break down the barrier between mainstream and

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special schools so as to create a "unified system" (p. 35). This was to be achieved in a range of ways, including promoting greater movement of children and staff members between systems and across sectors, and encouraged the dual placement of children with SEN in special and mainstream schools. The document requested local authorities to consider the potential of "outreach" by special schools to complement local services, and it proposed using capital funding to "co-locate" special and mainstream schools on the same site, stressing that this could also involve partnerships with "non-maintained" and "independent" schools (p. 35).

In 2006 the House of Commons Education and Skills Committee issued a report on special educational needs (House of Commons Education and Skills Committee 2006). It argued that, for many children with SEN, special schools provide an invaluable contribution to their education. They felt that the issue should not be their closure but how to progress to a system based on a broad range of "high quality, well resourced, flexible provision to meet the needs of all children" (p. 7).

The audit sponsored by the DfES of low-incidence provision referred to earlier (Gray 2006) recommended drawing together the development of "specialist" special schools into a more co-ordinated strategic regional planning network, which could include LA representatives, the voluntary sector, and regional change advisers, to identify the changes most likely to achieve local improvements.

The American literature on the role of special schools for the visually impaired has also focused on their potential for supporting mainstream education. Maron et al. (1981) highlighted the potential of special schools to play a role in the preparation and support of mainstream teachers. Maron outlined the possibility of short-term placements in special schools in the United States for teachers with limited experience of supporting visually impaired children. The paper described a two-week in-service training programme for public school teachers. The teachers were given direct instructional skills and provided with consultation help by the school staff during the ensuing academic year.

Harley and English (1989) investigated the role of American special schools in supporting inclusion programmes through offering professional development, resources, holiday programmes etc. A survey of residential schools for blind children was carried out to

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determine the extent of the services provided for visually impaired children in local day-school programmes. The survey revealed that all forty-one residential schools included in the survey were providing some form of service for these children, including professional development services, special intervention programmes, pre-school services, summer-school programmes, and book, equipment and supplies services. Residential schools in the more sparsely populated states provided more services than those in the more densely populated states.

Macuspie, Harmer et al. (1993) described the role of a Canadian special school in providing intensive short-term placements for visually impaired children from mainstream schools to help them develop specialist skills, such as mobility and Braille. The authors discussed the duration, goals, implementation and evaluation of these placements as well as administrative considerations and factors that are critical for their success.

Miller (1993) recorded the expansion of the outreach services provided by a school for the blind to increase the availability of appropriate support services for students with visual impairments throughout the state. Staff members from the school served as a resource for the families of children with visual and dual-sensory impairments and for related agencies and local service providers.

Spungin (2003) criticised the shortcomings of itinerant support systems for children with visual impairment, especially in the areas of supporting social interaction and daily living skills. She argued that itinerant teachers were required to serve large geographical areas and excessively large case loads and that the embrace of mainstreaming and itinerant teaching had unnecessarily been at the expense of residential special schools for the visually impaired. She proposed that special schools could provide unique teaching training and work experience and were a potential solution to shortages of teachers in itinerant programmes.

Summary

Regional provision has been suggested as a possible means of meeting the needs of children with low-incidence disabilities, including visual impairment. In the UK, proposals were considered for regional co-ordination committees that could plan services from their own regional budget and incorporate existing special schools and visiting teacher services in a

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continuum of provision that could operate in a multi-disciplinary environment with health and social services departments (DfEE 1997).

In relation to special schools for visually impaired children, some "expert views" argue for a continued and expanded role for special schools for the visually impaired that would allow them to work in partnership with mainstream schools to support effective inclusion. The potential important role of special schools is recognised in UK Government policy (DfES 2004), which recommends closer co-operation between mainstream and special schools and proposes capital funding for relocating special schools to mainstream sites. Some political opposition to the closure of special schools has emerged.

In the United States a recognition of the potential "outreach" role of the residential special schools in supporting visually impaired children in mainstream schools has been established for some time in the literature. Special schools are seen to have a role in the preparation of both specialist and mainstream class teachers, in the provision of short, intensive placements to children from mainstream settings, in the supply of specialist resources, and in the support and assessment of pre-school children.

3.3.4 Learning support in school: Views of parents and children

There have been some attempts by researchers to capture the views of children with visual impairment and their parents about their experiences of the services and support they receive at school and their needs and aspirations. Examples of such studies include a survey in the UK of the parents of nearly three hundred children conducted by the RNIB (Walker et al. 1992) and *Shaping the Future,* a later study by the RNIB of the experiences of blind and partially sighted children and young people. Part 2 of *Shaping the Future* (Franklin, Keil, Crofts and Cole-Hamilton 2001) attempted to capture the educational experiences of 5 to 16-year-olds with visual impairment and reported on the findings of a survey of the views of 625 children and their parents. In the case of some children with complex needs, the children's views were represented wholly by their parents.

The RNIB's conclusions were that, on the evidence of the survey, support in many mainstream schools had to improve "if inclusive provision is to meet the needs of blind and partially sighted pupils as well as specialist education does" and that "access to course material,

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equipment, activities and resources is often inadequate" (p. 6) in mainstream schools. Secondary education appeared to present particular barriers in mainstream: for example, it was reported that 25% of secondary pupils said they did not usually get hand-outs in their preferred format, 33% felt left out of some classroom activities because of impaired vision, and almost 50% said they avoided some courses because of practical problems. Geography, science and PE were identified as less accessible than other curriculum subjects. It was found that visually impaired children who were of average ability tended to stay in the same type of education provision throughout their compulsory schooling: that is, there was little movement between mainstream and specialist provision (only 10% changed the type of school they attended).

In relation specifically to visually impaired children who had additional complex needs, almost 50% of the 220 parents who contributed to the survey reported that they were not in touch with their local authority visual impairment service and had not been offered a choice of school, while 33% believed their child was left out of activities at school because of their disabilities. 75% of the children with complex needs in the survey received their education in special schools, with only 10% in special schools designated for children with visual impairment and complex needs. Of the 73 most highly dependent children, only 8% were in mainstream schools.

In general, the RNIB acknowledged that the survey showed that "a significant number of children were receiving satisfactory support and resources" and were "participating fully" in education alongside their sighted peers (p. 7). The survey identified the visiting specialist teacher of the visually impaired as having a key role to play by providing direct support to children, schools and parents and liaison between them. However, while "some mainstream schools" had been successful in providing a supportive and inclusive learning environment for their visually impaired children, "many parents" as well as children felt that teachers and other staff members in schools did not seem to have a sufficient understanding of the effects of visual impairment, and this sometimes made them seem unsympathetic.

As the following extract illustrates, there was no clear consensus among parents and young people about the debate regarding mainstream versus specialist provision, and the RNIB's conclusion was that in the interim the range of educational options should remain open.

The responses of both the parents and young people participating in this survey demonstrate that, whatever the government policy may be, some people remain firm supporters of special schools while others argue just as strongly in favour of full inclusion. Frequently, their opinions have been informed by very positive or negative experiences in one or other type of provision. *Blind and partially sighted children and young people are not part of a homogeneous group—they are individuals with unique needs which will vary during the course of their development. Until such a time as mainstream education is seen to function as a fully inclusive system, we recommend that a range of options should remain open to children and young people with visual impairments.* This will allow parents, teachers and the young people themselves to choose the type of school that is most likely to meet the individual child's needs at the various stages of their school career. (RNIB 2001, p. 170; italics added).

The report also contained information about parents' and children's views on a range of issues relating to learning support and provision, such as statements or records of special educational needs, access to the curriculum, access to extracurricular activities, and advice about bullying and about careers. However, when the parents of visually impaired children with average learning ability were asked to identify the most important factor that makes a good school (p. 159), 40% felt that it was "teachers who listen," 30% identified "sufficient help in the classroom," and 13% referred to the "absence of bullying."

The role of teachers (both class teacher and visiting specialist teacher) is clearly a critical element in successful learning support for children with visual impairment at school. (Issues relating to teachers are dealt with at length in other sections of this literature review.) However, an important feature of learning support for children with visual impairment has been the emergence in recent years in a number of countries of learning assistance in the classroom from staff members who do not have qualified teacher status. (See next section.)

Summary

There have been some attempts by researchers in the UK to capture the views of children with visual impairment and their parents about their experiences of the services and support

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they were receiving at school as well as their needs and aspirations. As an example, a two-part study by the RNIB offers some useful views on the educational experiences of children. As the scope of the study was exclusively the child's or the parents' views (or both), it is difficult to make judgements about the "completeness" of the findings, in that no reference is made to the views of other important stakeholders involved in the provision of the service or curriculum delivery. Overall it was found that a "significant" number of children reported receiving satisfactory support and resources and being able to participate fully in education alongside their sighted peers. The study highlighted however, key areas for improvement in the support provided to children in mainstream schools: access to the mainstream curriculum was identified as a barrier for many, but feeling "socially included" at schools was also emphasised as very important. The findings also identified the key role of the visiting specialist teacher of children with visual impairment in providing direct support to children, schools and parents and liaising between them, concurring with evidence presented below in relation to teaching assistants: that successful inclusion in a mainstream school requires appropriate support from qualified practitioners. A key conclusion of the report is that *a range of options should remain open to children and young people with visual impairments* to allow parents, teachers and the young people themselves to choose the type of school that is most likely to meet the individual child's needs at the various stages of their school career.

3.3.5 Learning support in school: The role of teaching assistants

While the use of a teaching assistant in the education of children with visual impairment appears to be common practice in Western countries, there are few empirical studies evaluating the role; as with other aspects of education, the literature is mostly descriptive. A difficulty in identifying literature is that assistant roles frequently have diverse names: for example, in the United States they are sometimes referred to as "para-educator" and in Australia as "teacher aide", while in the UK they can be referred to as "teaching assistant", "non-teaching assistant", "learning-support assistant", "support assistant", or "classroom assistant". In Ireland "special-needs assistants" often provide classroom support for visually impaired children, though, importantly, they formally have a care role rather than a learning-

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support role. For the purposes of this review, the generic term "teaching assistant" will be used.

The nature of the work that teaching assistants carry out also varies considerably, often even within countries. According to Topor, Holbrook and Koenig (2000), in the United States a teaching assistant

> is an individual who works under the direction of the teacher of students who have visual impairments … [and whose] activities may include preparing materials such as braille, tactile graphics and enlarged print … [and who] may perform general school duties, reinforce children's orientation and mobility skills during travel, perform self-care routines for students who need assistance, provide feedback about visual activities and reinforce the use of optical devices. (p. 8)

In Australia the teaching assistant's role is "to help the student achieve maximum independence and inclusion" (Gale 1998). In the UK a teaching assistant may carry out a variety of roles, as described above, working either mainly or solely with one child or with a number of children in the classroom.

Recruitment and management of teaching assistants

In England, teaching assistants can be employed and managed either by the visual impairment service or by individual schools. In the NFER report cited earlier, Morris and Smith (2008) found that teaching assistants dominated the non-teaching staff employed by visual impairment services in local authorities, with a total of 229 staff members reported by respondents (i.e. a mean of 3.98 FTE teaching assistants per visual impairment service). Outside the visual impairment service it was also common for schools to recruit and employ teaching assistants for work with visually impaired children and young people, with a total of 1,467 reportedly in posts with 43 of the reporting visual impairment services and a mean of 34 teaching assistants in any one visual impairment service. In 41 cases the visual impairment service in the local authority said that it played a role in the recruitment of such staff members, with two-thirds of those involved in writing job descriptions and person specifications (66%) and approximately three-quarters involved in shortlisting (76%) and interviewing (73%).

There is general agreement in the literature that teaching assistants can best help visually impaired children if they have an understanding of visual impairment and how it affects the individual child (see Clamp 2000; Talbot 2002; Russotti and Shaw 2001). Lomas (1997) describes how teaching assistants in the UK benefit from being attached to the visual impairment service or at least from having regular contact with a specialist visual impairment teacher. Along with others (e.g. Arter, Mason, McCall, McLinden and Stone 1999), Lomas (1997) warned that accredited training opportunities for teaching assistants were limited; more than ten years later, this is still largely the case in the UK.

An example of accredited training available to teaching assistants in the UK is the certificate course for teaching assistants called "Partners in Learning", which leads to a BTEC level 3 advanced certificate. It is a modular course offered by the RNIB and the Open University that uses a blended learning approach of face-to-face training with on-line study and discussion activities. The stated aims of the course are to develop an understanding of visual impairment and its implications for children and young people and practical skills for use in daily regular support, skills of effective team work, and skills that will encourage children to become increasingly independent and able to take part in the direction of their support.

The survey by Morris and Smith (2008), however, found that only 34% of teaching assistants employed by visual impairment services and 41% of teaching assistants employed directly by schools had access to externally accredited training. While the reported level of uptake of external visual impairment training was low, most visual impairment services (84%) reported having input during the induction period for teaching assistants, with 92% providing ongoing advice and guidance for teaching assistants and 95% providing information about training opportunities (p. 94).

Porter and Lacey (2008, cited earlier) investigated the match of children's needs with provision in the context of the increasing use of non-visual-impairment-designated and non-specialist forms of provision in the UK for children with visual impairment and complex needs. The data, collected largely from self-administered questionnaires from 172 teachers and 238 teaching assistants, suggest that, despite a lack of access to training, levels of self-confidence about working with and supporting children with visual impairment were quite high. The authors were concerned that this confidence was misplaced and reflected the limited knowledge the

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respondents had of the implications of a visual impairment for providing children with appropriate learning opportunities. Porter and Lacey concluded that local authorities should consider more strategically the placing of children and their access to staff with specialist training.

The responsibilities of teaching assistants

A study by Davis and Hopwood (2002) found that, while the role of teaching assistants in mainstream schools varied, in all seventeen cases studied the teaching assistant was responsible for producing teaching materials in alternative formats, which for many constituted their main task. While teachers acknowledged the importance of planning their lessons well in advance and communicating their intentions to the teaching assistant, in practice there was limited time for communication, and planning was often done more in an *ad hoc* manner. Also observed was a variation in the role of the teaching assistant with regard to the amount of time they spent with individual children and in what context. When they sat next to the child with visual impairment most of the time, this was seen as detrimental to the child, both educationally (as it took away their attention from the class teacher and the lesson being conducted) and with regard to their social inclusion with other pupils. There was also concern that this could make the visually impaired child too dependent on the teaching assistant. Examples of good practice were found, however, where the teaching assistant worked in partnership with the class teacher, acting as a facilitator engaged in group work with a small group of children, or where they might take on whole-class teaching while the class teacher worked exclusively with the child with a visual impairment. The authors felt that this model of practice ensured that the child with visual impairment was less segregated from the other children in the class.

A project commissioned by the RNIB, the results of which have yet to be published, was recently carried out by Wall and Kemanopoulou at the London Institute of Education. It involved an examination of the teaching strategies and learning environment in three subject areas (English, maths, and science) for year 8 pupils, including blind and partially sighted learners and learners with literacy needs. One of the research themes explored the role of teaching assistants in enabling groups to gain access to the curriculum.

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Mixed qualitative and quantitative methods were used, including observation of lessons, interviews, and questionnaires, with a range of participants, including an entire year 8 (aged 12) secondary-school cohort of pupils (n = 246), their English, maths and science teachers (n = 19) and teaching assistants (n = 17), the school SENCO, and the head of an attached visual needs unit. Some of the preliminary findings relating to teaching assistants include reflections on

- issues of teachers' planning and how feedback from teaching assistants' work with individual pupils informs the teachers' lesson planning
- liaison between teacher, teaching assistant and SENCO with regard to learning activity, design, and development
- mismatches between teachers' strategies and the needs of those being supported
- an identified lack of training and expertise in identifying, understanding and meeting different forms of needs
- differences in support strategies between teaching assistants and specialist visual-impairment teaching assistants.

Until the findings are published in full it is difficult to assess the impact of this research and the lessons that can be learnt from it; however, it suggests that issues relating to liaison between school staffs and specialist training again come to the fore.

There has also been some research on teaching assistants' efficacy in supporting particular curricular subjects. For example, Gray et al. (2007) undertook a small-scale study to evaluate the effect that teaching assistants have on the reading attainment of young children taught in schools using a whole-class systematic phonics approach. They found that, despite general indications that pupils who were exposed to this approach showed a significant improvement in reading performance, no added value was noted for pupils who received assistance from teaching assistants. Instead the results suggest that such support may have a detrimental impact on lower-ability readers.

Keil and Clunies-Ross (2002) carried out an investigation into the teaching of Braille to children in schools in England, Scotland and Wales in response to a perceived decline in the teaching and the standards of Braille. Part of the study dealt with how Braillists are supported by both the teaching and the non-teaching staff and the type of training that teachers and

teaching assistants had in teaching Braille literacy. Methods included a national postal questionnaire survey of LEA visual impairment advisory services and case studies of four LEA visual impairment advisory services and one specialist school for blind and partially sighted children. They found that the extent of involvement and the role of teaching assistants in the teaching of Braille varied according to the model of delivery employed. For example, teaching assistants were described as being involved in delivering a programme of Braille teaching designed by a QTVI in 72% of the 81 visual impairment services that were supporting Braillists. The extent to which teaching assistants were involved in planning and delivering a programme of teaching (again under the guidance of the QTVI) was less marked, i.e. in 40% of the visual impairment services. In only 9% of cases was the teaching assistant responsible for planning and delivering the programme of Braille teaching. Once again this appears to relate to training issues, as only 41% of visual impairment services said that the teaching assistants involved in working with Braillists had undertaken training in teaching Braille or Braille literacy to children. In 34% of the LEAs the teaching assistants had experience of teaching Braille but not Braille literacy to children. Only in 13% of cases had the teaching assistant received training of this nature. The authors conclude that Braillists can be successfully supported in a range of different educational settings so long as there are specialist staff members available, adequate training for the staff, and properly directed funding. In relation to the role of teaching assistants in particular they urged that attention should be given to their status, pay, and training opportunities, a notion supported by the DfES guidelines issued in 2001 on quality standards in education support services for children and young people with visual impairment.

Pavey, Douglas, McLinden, McCall and Arter (2002) looked at the mobility and independence support provided to visually impaired children in mainstream schools in the UK. Interviews and focus groups were carried out with a number of professionals who were specialists in mobility and independence (M&I) or in rehabilitation. A number of participants talked about the work that some teaching assistants do with visually impaired children in reinforcing mobility and independence skills, under the guidance of the M&I specialist, though in one authority teaching assistants were trained to teach some aspects of mobility and independence rather than simply to reinforce skills initially taught to children by the M&I specialist. This was not considered by all to be best practice, however, unless the teaching

assistant had received adequate training either from the M&I specialist or through external courses. Once again the level of training available to teaching assistants in supporting this type of work was raised as a concern. In most cases where teaching assistants had undertaken training it was provided informally by the M&I specialist or QTVI, or both.

Summary

While the use of teaching assistants in the education of visually impaired children appears to be common practice in Western countries, there are few empirical studies evaluating the role, and, as with other aspects of the review in this section, the literature is largely descriptive. A difficulty in identifying literature is that assistant roles frequently have diverse names.

The nature of the work that teaching assistants carry out also varies considerably, often within countries. There is evidence in the literature, for example, of variation in the role of the teaching assistant with regard to the amount of time they spent with individual children.

There is evidence to suggest that teaching assistants can best support children with visual impairment where they have an understanding of visual impairment and of how it affects the individual child. However, accredited training opportunities for teaching assistants are limited, with evidence from one study in the UK that more than two-thirds of teaching assistants do not have the opportunity to gain a specialist qualification (Morris and Smith 2008). Of particular significance is evidence from a research study suggesting that the teaching assistant can serve as a barrier to inclusion if not used appropriately, with their role being seen as detrimental to the child both educationally and in respect of their social inclusion with other pupils (Davis and Hopwood 2002; Gray et al. 2007). Models of good practice have been identified and include the teaching assistants working in partnership with the class teacher and serving to ensure that the child is less segregated from the other children in the class.

3.3.6 Key findings: Educational placement and models of learning support

- A range of national models has been proposed for the provision of effective learning support to children with visual impairment. While there is limited empirical data in the literature to demonstrate the relative effectiveness of different models of educational support for children with visual impairment, a recurrent theme in the literature is that

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the heterogeneous nature of the population requires a range of support options to meet individual needs.

- There is a consensus in the literature about the requirements for effective learning support for visually impaired children. These include effective provision for identification and assessment; appropriate specialist training for staff members; affording access to both the mainstream and the additional curriculum; and access to specialised resources and technology. While there is a range of sources that attempt to describe the model or type of support required, there is little attempt to quantify what is required at the level of the child specifically for visually impaired pupils.

- There is consistent agreement that multi-agency working is an essential feature of effective support.

- The role of the special school: There is support in the literature for a continued and expanded role for special schools for the visually impaired that would allow them to work in partnership with mainstream schools to support effective inclusion. The proposed roles include the preparation of both specialist and mainstream class teachers; the provision of short, intensive placements to children from mainstream settings; the supply of specialist resources; the development of specialist approaches to delivery of the curriculum; and the support and assessment of pre-school children. Recent UK policy has facilitated the relocation of special schools (including one school for students with visual impairment) to mainstream sites.

- The role of designated (non-visual-impairment) special schools: Evidence from the literature suggests that the majority of children with multiple disabilities and visual impairment are placed in such schools (that is, local authority schools designated primarily for children with severe or profound learning difficulties, physical impairments, generic complex needs, etc.). There is a variety of approaches to ensuring that the needs of children with visual impairment are met in these settings, including specialist training for staff members who work in these schools.

- Regional provision has been suggested as a possible means of meeting the needs of children with low-incidence disabilities, including visual impairment. In the UK proposals were considered for regional partnerships that could plan services from their own regional budget and incorporate existing special schools and visiting

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teacher services in a continuum of provision that could operate in a multi-disciplinary environment with health and social services departments.

- Specific guidance has been identified in the literature that could be helpful in developing learning-support services. Two recent documents from the UK have particular relevance, linked to standards for educational services and the eligibility criteria for services.

- The findings of a national survey of children and parents in the UK show that barriers to gaining access to the curriculum are of key concern to many. The survey identified barriers to social inclusion in mainstream schools that were also of concern. An additional implication of this work is that it suggests that educational services should communicate clearly with stakeholders about the services offered and the rationale for their design (for example the use of different literacy formats).

- Teaching assistants appear to be a key mechanism for learning support in many service designs (including Ireland, through "special-needs assistants" in a care role). The literature suggests that it is critical that the teaching assistant's role be clearly defined and understood to ensure that it facilitates communication between visually impaired children and their sighted peers and the classroom teacher.

- There is agreement in the literature that teaching assistants can best support visually impaired children if they have an understanding of visual impairment and how it affects the individual. This has implications for the training of these staff.

3.4 Professional training: Teacher education

3.4.1 Introduction

The focus of the commissioned literature review is not on professional training and development. However, the literature shows that training is important for those who teach visually impaired children. For this reason the review team carried out a review of the literature in relation to professional training, with a particular focus on teacher education.

This strand is divided under the following broad headings:

1. Standards and competencies for teachers

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2.   Teacher training—national and regional models

3.   Delivery modes

3.4.2 Standards and competencies for specialist teachers

There is increasing recognition in the literature of a need to ensure that there are suitably trained professionals with specialist expertise to support students with visual impairment, particularly in the light of an increase in mainstream school placements (e.g. Spungin 1977, 1978; Mason 1997, 1999; Lowenfeld 1989). As an example, Lowenfeld (1989) highlights "new challenges" for professionals in the field of blindness, calling attention to mainstream placement and the need for trained professionals whose expertise would enhance the education of visually impaired and blind children. This sentiment is supported by Mason (1997), who reports that the role of the specialist teacher of children and young people with a visual impairment has changed dramatically in the previous two decades. She notes that, whereas twenty-five years ago training courses for specialist teachers prepared them exclusively for work in designated special schools for children with visual impairments, where they would generally teach classes of children of comparable age and ability, "teachers now require preparation for work in a variety of settings with a wide range of ages and abilities" (p. 428). Furthermore, it is argued that "teachers can no longer assume that they will have one type of job for life: special schools for the visually impaired are decreasing in number; the integration/inclusion debate continues, and there are observable changes in the defined population: for instance a greater proportion of children with a visual impairment have additional disabilities" (p. 428).

Wolffe et al. (2002) report that the field of education for students with visual impairment maintains a "long held belief that there are certain areas of competence beyond the traditional academic curriculum that children and youths with visual impairments must attain if they are to become contributing members of society" (p. 293). They note that as early as 1918 the American Association of Instructors of the Blind identified skills that effective teachers needed to provide, for example training in "homemaking for girls". Since that time there have been a number of attempts to define the essential knowledge, understanding and skills required by specialist teachers of children with visual impairment through the use of "competency based programmes". Taylor (1978) defines such programmes as those in which

"the objectives of the training, or educational programme, are specified and reviewed regularly to ensure that they continue to be relevant to the needs of the child, or the potential teacher, and the community in which he or she may live or work" (p. 161). During the period 1973–75 the American Foundation for the Blind (AFB) worked with professional teacher educators for the visually impaired to produce a national competence-based curriculum. The outcome of this work was the publication of the booklet *Competency Based Curriculum for Teachers of the Visually Handicapped: Field Testing Edition* (Spungin 1977). The booklet described detailed areas of competence, written in behavioural terms and covering twelve goal areas relating to the following seven teaching activities:

- assessment and evaluation
- educational instructional strategies
- guidance and counselling
- administration and supervision
- media and technology
- school-community relations
- research.

Drawing on these seven activities, Spungin (1978) sought information on behalf of the AFB through a national survey of teachers of the visually impaired in the United States in order to "define what specialized competencies are necessary for teaching visually handicapped children, over and above those needed to teach sighted children" (p. 163). She collected information from 807 teachers (a response rate of 41%) about their attitudes towards the AFB "competencies". Phase 1 of the study compared what teachers said they do with their reactions to the competencies. Phase 2 analysed teachers' roles and compared role and function with reaction to the competencies. Key findings from the study included:

- Teacher training programmes for teachers of children with visual impairment must differentiate, in student programme planning, various future roles of teachers.
- Competencies not "highly agreed with" by all or some groups of teachers should not be regarded as "unnecessary".
- The contributions of different types of teachers of children with visual impairment "probably vary according to the personal characteristics of the people who occupy

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the positions. There is so much of the individual in each job [that] it may in fact be the *person* one really evaluates when attempting to assess the functions in certain roles." (p. 169)

The broad "competencies model", specifying the requisite knowledge, understanding and skills for teachers of the visually impaired, has been drawn on in other places. including the UK (Mason 1997) and Continental Europe (Mason 1999) as the basis for the design of teacher preparation programmes. For example, Mason (1999) reports the outcomes of an international collaboration of teacher trainers from Finland, Sweden and the UK to devise a curriculum for trainers of teachers of the visually impaired throughout Europe that draws on a set of competencies developed in the UK. More recent work in the United States (Spungin and Ferrell 2000) has provided a breakdown of the specialised responsibilities of specialist teachers of the visually impaired. These activities have been categorised under the broad headings of "assessment and evaluation", "learning environment", "adapting the curriculum", "guidance and counselling", "administration and supervision", "school-community relations", and "services development".

The work of the Visually Impaired Trainers' Consultative Group (VITCG) in the UK, a group formed from representatives of the universities involved in training teachers of children with visual impairment, was influential in developing nationally agreed competencies in the UK. As Mason (1997) notes, in an attempt to "preserve the quality of specialist courses" the group defined the core elements of training required and the "competencies" that all specialist teachers should be able to demonstrate after a period of mandatory training. The competencies were intended to form the basis for discussion by teachers, as well as to "provide parents with the information with which to assess the skills and understanding of those responsible for delivering the National Curriculum and the special curriculum to their child" (Mason 1997, p. 430). Assessment of the competencies was based on a demonstration of "knowledge and understanding" (for example through written assignments, seminars, etc.) as well as a demonstration of "practical ability" (for example through an observed teaching placement). The agreed set of VITCG competencies was incorporated in a national report to the Department for Education and Employment, prepared by the Special Education Needs Training Consortium (SENTC 1996).

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More recently the VITCG competencies have been subsumed into a national set of specialist standards developed by the Teacher Training Agency. The standards were conceived of as an audit tool for helping teachers to identify their specific training and development needs in relation to the effective teaching of pupils with severe or complex SEN. This development took place as part of the UK Government's "Programme of Action" to meet special educational needs (DfEE 1998). The programme set out a broad agenda to ensure that the needs of all pupils with SEN were met through greater access to the curriculum and specific training for teachers. An important aspect of the programme was teachers' continuing professional development.

The Special Educational Needs Specialist Standards (TTA 1999) were divided into four sections:

1. The "core" standards: setting out the professional knowledge, understanding and skills common to the full range of severe and complex forms of SEN.
2. The "extension" standards: providing a summary of key aspects of specialist knowledge, understanding and skills that provide a "sound foundation for improving the education of pupils with the most severe and/or complex special educational needs" (TTA 1999, p. 4).
3. Standards in relation to key SEN specialist "roles and responsibilities" (i.e. advisory, curricular, and managerial).
4. "Skills and attributes" required by teachers working with pupils with severe or complex SEN.

Teachers undertaking a specialist qualification to work with children with visual impairment are required at present to demonstrate their knowledge, understanding and skills in relation to all the core standards and selected elements from the extension standards (which effectively incorporate the former competencies) as well as all standards listed under the specialist roles and skills or attributes.

There is evidence in the literature that the knowledge, understanding and skills needed to teach children with multiple disabilities and a visual impairment (MDVI) have been seen as supplementary to that required to work with other children with visual impairment. As an example, a paper by Gordon and Ashcroft (1979–1980) describes a "Competency Based

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Teacher Education" (CBTE) programme that was developed to ensure that trainees were adequately prepared to face the challenges of educating children and adults with severe disabilities. Similarly, Erin (1986) examined the positions regarding service delivery to children with MDVI taken by certified teachers of visually impaired students and listed concerns that needed to be addressed by those preparing teachers to work with this population. With the introduction of national agreed standards and competencies in England and Wales, preparation to work with children who have MDVI is now likely to be regarded as an integral part of specialist preparation courses for teachers of the visually impaired. However, training to work with children who are deaf-blind is provided separately in the UK. Specialist credit-bearing courses leading to discrete qualifications in working with children with multi-sensory impairment or the deaf-blind are available for teachers and other professionals involved in their education.

From 2001 all "mandatory qualification" (MQ) course providers in England have been required to apply to the Teacher Development Agency (TDA) at periodic intervals for approval to run a training course leading to the mandatory qualification in visual impairment. MQ courses planned to run from 2009 have been assessed in accordance with the requirement that they

1. have as their main objective and outcome the raised achievement of children and young people with visual impairment through improving participants' professional knowledge, understanding, and skills;
2. respond to participants' identified training and development needs by offering appropriately differentiated provision that is of high quality, matched to participants' training and development needs, promotes progression towards the course outcomes, and makes best use of available resources;
3. be delivered flexibly, without compromising appropriate progression and quality of outcome, to maximise access for participants;
4. be informed by the needs of stakeholders and involve them in the development, delivery, evaluation and improvement of the provision;
5. be of a consistently high quality and subject to rigorous quality assurance procedures and be supported by mechanisms for monitoring, evaluating and improving the impact

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of provision on participants' competence and the achievement of children and young people with visual impairment.

Summary

There is increasing recognition in the literature of the need to ensure that there are suitably trained professionals with specialist expertise to support students with visual impairment, particularly in the light of an increase in mainstream school placements and the changing needs of the population. Various attempts have been made to define the key knowledge, understanding and skills required by teachers of the visually impaired. Early work in the United States (e.g. Spungin 1977) focused on the "competencies" that specialist teachers of children with visual impairment should be able to demonstrate. The "competencies" model was adapted for use in the UK and Europe more generally. More recently in the UK these have been subsumed into the "extension" standards for specialist teachers of the visually impaired that were issued as part of the National Special Educational Needs Standards (TTA 1999). The competencies and standards are often used as the basis for the design of teacher preparation programmes. There is evidence that the knowledge, understanding and skills needed to teach children with MDVI were considered to be supplementary to those required for working with other children with visual impairment However, with the introduction of the specialist standards in England it is now likely to be regarded as an integral part of a visual impairment teacher preparation programme. Specialist credit-bearing training is, however, available in the United Kingdom for teachers and other professionals who work with children who are multi-sensory-impaired (MSI) or deaf-blind.

3.4.3 Teacher training: national and regional models

Systems for the training of specialist teachers of the visually impaired may operate at the national or the regional level, for example within a state or province (e.g. Corn and Silberman 1999; Clarke 1985). When training is delivered at regional level there is evidence that significant variations may develop in the training requirements or content. As an example, a national study by Huebner and Strumwasser (1987) examined the state certification of teachers of blind and visually impaired students in the United States through a survey of certification officers working in state departments of education. The survey revealed that

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forty-five states offered vision-specific certification and that requirements and policies varied greatly from state to state. This finding of wide variation in regional requirements is supported by Corn and Silberman (1999), who examined thirty-nine programmes that prepare personnel for working with children and adults with visual impairments in the United States. The responses revealed the variety of models that were available for the provision of "pre-service" education.

There is some evidence that regional provision is often modified to reflect the particular needs of the client group in that part of the country. For example, Gates and Kappan (1985) provide a rationale for the "multi-competency" approach to teacher preparation adopted by the University of Northern Colorado. The programmes were designed as dual qualifications to prepare teachers of the visually impaired for providing both academic support and instruction in orientation and mobility to children. This multi-competence approach was developed in response to the needs in the sparsely populated states of the Rocky Mountain and Great Plains region.

There is some evidence that special schools for the visually impaired can play a supportive role in teacher preparation at the regional level. As an example, an early paper by Stolle et al. (1981) describes how a residential special school provided a state-wide resource for improving services to visually impaired children through a two-week in-service training course inaugurated by the Washington State School for the Blind (WSSB) for public-school teachers with limited backgrounds in working with such children. Teachers were given direct instructional skills and provided with consultation help by members of the WSSB staff during the ensuing academic year. The authors propose that this training model may have important implications for meeting the future educational needs of visually impaired children, as well as other individuals from low-incidence areas.

There is evidence of long-standing concerns in the United States about the shortage of specialist teachers (especially in rural areas, where children are often supported by teachers without specialist training) and funding for teacher education. An example of an innovative project designed to address this issue is a paper written more than thirty years ago by McInvale (1977). The paper reports on a three-year project carried out at Florida State University specifically to address the shortage of trained personnel for teaching visually

impaired children in the south-eastern states. Selected students from Alabama, Louisiana and Mississippi were trained in order to return to their states of origin and be employed to teach visually impaired children; however, McInvale (1977) reported difficulties in the consequent placement of graduates in posts in their states of origin because of a reduction in funding or the diversion of funds from the visually impaired to higher-incidence disabilities, the lack of day-school educational programmes, the retention of untrained teachers in positions that could have been filled by project graduates, and the non-co-operation of administrators in state education agencies.

More recent concerns have emphasised the uncertain future of teacher training faculties in universities. As an example, a paper by Silberman, Corn et al. (1989) reports on the results of a national survey of all known university courses in the United States that were preparing personnel to serve visually impaired children and youth in 1987/88. Thirty-eight full-time members of the academic staff of twenty-seven universities in sixteen states responded to the questionnaire. The data revealed that the future of these programmes could be at risk, resulting in a shortage of appropriately prepared teachers. The implications are discussed with regard to the national shortage of teachers of the visually impaired in the United States, present levels of funding, and other factors.

England and Wales are unique in having a mandatory qualification (MQ). Teachers working in special schools for the blind or visually impaired in England and Wales are required to undertake an additional "mandatory" course of training (a one-year full-time equivalent) and to successfully complete it within three years of their appointment to the school. Although the regulations do not apply in law to teachers of children in other contexts (for example those with local authority advisory or peripatetic roles), teachers are often contractually obliged to complete the mandatory qualification; and, as Mason (1997) reports, "the trend during the last ten years has been for many of them to do so" (p. 427). However, Mason notes that at that time few teachers in schools for pupils with more complex needs (for example children with severe or profound learning difficulties) were qualified to teach pupils with a visual impairment.

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Summary

Systems for the training of specialist teachers of the visually impaired may operate at the national or the regional level. When training is delivered at the regional level there is evidence of inconsistency in the requirements or content, although this may simply be a reflection of modifications to ensure that training is responsive to local needs (e.g. Huebner and Strumwasser 1987). There have been long-standing concerns in the United States about the shortage of specialist teachers (especially in rural areas, where children are often supported by teachers without specialist training), and funding for teacher education. More recent concerns focus on the uncertain future of teacher training faculties in universities. There is evidence that special schools for the visually impaired can play an important role in supporting personnel.

3.4.4. Delivery modes

A range of systems is used to deliver training for specialist teachers of the visually impaired. Increasingly, the traditional full-time training courses provided in colleges have been supplemented by or replaced with open or distance education (DE) approaches. As an example, DeMario and Heinze (2001) report on the status of distance education in personnel preparation courses in visual impairment in the United States. Through a national survey they found that over half the personnel preparation courses for teachers of children with visual impairments, orientation and mobility specialists and rehabilitation teachers included a distance education component and used a wide variety of technology and instructional methods for the provision of distance education. Most courses also had a field experience component and relied on external funding for support. Distance education is seen by its proponents as an efficient way of delivering training to large groups of specialist teachers, especially those unable to commit themselves to extensive periods of study away from home. Arter and Mason (1996) discuss the development of the distance education course at the University of Birmingham and its role in training teachers of children and young people with a visual impairment who are unable to attend a college-based option.

In Sweden, where the responsibility for the education of all blind and visually impaired children (except those with severe additional disabilities) has been transferred from the specialist sector to local schools, open and distance learning (ODL) was adopted as the

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preferred method for instructing general classroom teachers in relevant competencies (Soderberg and Fellenius 2000). The approach involved the use of advanced technology systems and led to a "transformative" experience for teachers and students.

There is evidence that the isolation felt by some learners in DE programmes can be ameliorated by the use of new technologies to promote interactive on-line learning. Methods used in the preparation of medical personnel, such as problem-based learning, have been suggested for the training of teachers with visual impairment (Aitken et al. 2001). McLinden et al. (2007) report on the use of on-line problem-based learning (PBL) resources, with teachers studying for a specialist qualification through distance education. They explain how pilot on-line PBL resources were embedded within two modules of a restructured programme of study in visual impairment. Following participation in the on-line components, participants completed a questionnaire designed to collect information on various aspects of their engagement in the activities. The paper discusses the format and design of on-line PBL case scenarios and their role in helping to develop participants' knowledge and understanding. The findings suggest that these resources could have an important role to play in the future professional development of practitioners supporting children with special needs. On-line technologies have also been applied to the preparation of learning assistants. Lynch (2008) describes how her training affected her work with students, and information is provided about a new blended learning programme, incorporating collaborative on-line learning, designed specifically for learning assistants.

Summary

A range of systems is used to provide training for specialist teachers of the visually impaired. Increasingly, the traditional full-time training programmes delivered in colleges have been supplemented by or replaced with open or distance education (DE) approaches. DE is seen by its proponents as an efficient way of delivering training to large groups of specialist teachers, especially those unable to commit themselves to extensive periods of study away from home. The isolation felt by some learners in DE programmes can be ameliorated by the use of new technologies to promote interactive on-line learning.

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3.4.5 Summary

The literature shows that defining the "competencies" teachers require in order to work with children with a visual impairment is an approach adopted in some countries. More recently in the UK the competencies have been subsumed into the "extension" standards for specialist teachers of the visually impaired that were issued as part of the National Special Educational Needs Standards (TTA 1999).

Some countries have a requirement for teachers to have a specialist qualification to teach visually impaired children (for example the UK and the United States). However, Ireland has no such requirement.

There have been long-standing concerns in the United States about the shortage of specialist teachers, and about the funding for teacher education. In England, in response to current and predicted shortages of specialists, very recent initiatives have made more funding available for training. More recent concerns include the uncertain future of teacher training faculties in universities. There is evidence that special schools for the visually impaired can play an important role in supporting personnel preparation.

The degree to which training should prepare teachers to deliver mobility training in the absence of mobility specialists is an unresolved issue (and is discussed elsewhere in this review: see section 5.2, Mobility and independence).

A range of systems is used to deliver training for specialist teachers of the visually impaired. Increasingly, the traditional full-time training programmes in colleges have been supplemented by or replaced with open or distance education (DE) approaches.

3.4.6 Key findings: Professional training

- A number of countries have defined "standards" for specialist teachers of the visually impaired. Such standards underpin some of the courses available for training specialist teachers.
- Some countries have a requirement for teachers to have a specialist qualification to teach visually impaired children (for example the UK and the United States). However, Ireland has no such requirement.

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- Even so, there have been long-standing concerns in the United States (and to some extent the UK) about the shortage of specialist teachers, and of funding for teacher education.
- Increasingly, the traditional full-time training programmes delivered in colleges have been supplemented by or replaced with open or distance education (DE) approaches to training.
- There is evidence that special schools for the visually impaired can play an important role in supporting personnel preparation.
- The degree to which training should prepare teachers to deliver mobility training in the absence of mobility specialists is an unresolved issue

4. Review Focus: Classroom and the Curriculum

4.1 Introduction

The focus of this section is "the classroom and the curriculum". The section is structured under five headings to reflect the main strands of the literature within this theme. Each sub-section concludes with key points and recommendations.

- Assessment of learning needs (4.2)
- Pedagogy and teaching strategies for gaining access to the curriculum (4.3)
- Access to public examinations (4.4)
- Print literacy (4.5)
- Braille literacy (4.6)

4.2 Assessment of learning needs

4.2.1 Introduction

The ability to assess the development and learning needs of children (whether they have a visual impairment or not) is a cornerstone of education. In the context of visual impairment, Tobin's (1994) book on assessment procedures is an important source of information on assessment (albeit with a UK emphasis). His analysis makes a distinction between the assessment of "pre-school", "school-age" and "children who have MDVI" as well as the overarching assessment of "vision and visual perception". A similar structure is used in this section, with reference made to relevant and more recent literature. The following areas of assessment are covered:

- Assessment of vision and visual perception
- Assessment of pre-school children
- Assessment of school-age children
- Assessment of children with MDVI

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4.2.2 Assessment of vision and visual perception

In discussing the assessment of vision, Tobin (1994) notes that "it is the eye specialists' diagnosis of visual impairment and their measure of visual functioning that constitute the starting point" (p. 10). This illustrates a key conclusion of the "Low vision training" and "Identification" sections of this review, namely that multi-disciplinary teams that work in both the education and the health services are important. Nevertheless, communication is also considered to be critical. Aitken and Buultjens (1991) report on a study of the methods that twenty-one ophthalmologists used to assess the visual acuity of children with MDVI. The data demonstrated not only the difficulties they encountered in assessment but also the fact that communications with parents and educational and rehabilitation personnel were not clear.

Many visual assessments procedures derived from clinical practice (and linked to specific visual functions, such as visual acuity, visual field, contrast sensitivity, and colour vision) have been found to be useful tools among educational (and rehabilitation) practitioners. Examples of such procedures include the Snellen chart and E-chart (distance visual acuity) and the "N" point test and McClure reading test (near-vision acuity). These assessments can be useful (in combination with informal observation), as they offer practitioners an insight into functional vision in a non-clinical setting (for example in the home or a classroom). Even so, caution is required when using these tests and interpreting their results (and, in the case of some assessment procedures, an eye specialist is required).

It is this drive to take assessment from the clinical to the "real-world" (or functional) setting (and link to educational programmes) that led to the development of procedures designed to assess the visual perceptual skills in children. Examples of these include Look and Think (e.g. Chapman et al. 1989, out of production), Vision for Doing (Aitken and Buultjens 1992), and VAP-CAP (Blanksby and Langford 1993). These procedures have been developed through trials with visually impaired children and include assessments of different aspects of vision. As an example, Look and Think identified eighteen different visual skills that a teacher could assess through the use of test materials and a check-list (for example visual discrimination, visual matching, perception of symmetry, hand-eye co-ordination, and colour differentiation). Given that these assessment tools were developed for teachers, they were

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often linked to teaching activities. For example, Look and Think specified fifteen related activities that could be used for teaching purposes.

Another important issue in the literature is that of cortical or cerebral visual impairment (CVI). As an example, Jan et al. (1987) describe the different profiles of behaviour presented by children with CVI compared with ocular visual impairment (based on fifty children), for example variable and inconsistent visual performance, including visual acuity, seeing better in familiar environments and when they understand what to look for and where to look for it, often using touch to identify objects, and an ability to identify colours much stronger than their perception of form.

4.2.3 Assessment of pre-school children

Tobin (1994) highlighted three pre-school tests specifically designed for visually impaired pupils. The two most up-to-date tests were the "Reynell-Zinkin Scales" (Reynell 1979) and the "Oregon Project for Visually Impaired and Blind Pre-school Children" (Brown at al. 1986). The Reynell-Zinkin Scales enable a comparison between the development of children who are blind, partially sighted and normally sighted and provide some key evidence for the delayed development associated with visual impairment (and indications of intervention). Despite their age, the Reynell-Zinkin Scales are the only semi-standardised and normative scales available for young children with visual impairment (Dale and Salt 2007), although more recently Vervloed et al. (2000) have developed new age levels and suggestions for assessment use. The Oregon Project is more explicitly linked to intervention, as it incorporates an associated teaching package. Both methods of assessment have been extensively used in the UK, the United States, and elsewhere.

More recently in the UK, Dale and Salt (2007, 2008) describe the development of an "Early Support Developmental Journal" for use with young visually impaired children and babies that provides a structured sequential guide of expected developmental steps in young children with visual impairment aged 0–36 months. As Dale and Salt (2007) report, the journal "builds on the current research and knowledge of the Developmental Vision team and other researchers and practitioners and expands on the guide (Sonksen and Stiff 1991), providing more finely graded steps of key developmental sequences especially in the areas of object

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relationships and reasoning, communication and social development, language and meaning, play and learning, movement and mobility and self-help skills" (p. 687). The Developmental Journal is based on strong empirical foundations, including the Reynell-Zinkin scales, a significant study carried out by Sonksen et al. (1991), and the experience of the Developmental Vision team at Great Ormond Street Hospital for Children, London. It is therefore the most contemporary and most empirically based tool of its kind.

4.2.4 Assessment of school-age children

A central feature of many assessment procedures for school-age children is that they are timed. For Tobin (1994) this was another challenge for visually impaired children. Williams (1956) adapted an existing intelligence test and standardised it for use with visually impaired children. In spite of its age, the Williams Test is still in use, as it is the only British intelligence test to be standardised in this way. In contrast, the Blind Learning Aptitude Test (BLAT) developed by Newland (1971), based on embossed raised lines, was designed specifically for students with visual impairment. Furthermore, because of its relatively low verbal content the BLAT has greater potential to be used with non-English-speaking children. As an example, Mason and Shukla (1992) describe using it successfully in India.

The relative lack of assessment tools for measuring ability is a challenge in education systems that draw on such procedures for assessing children with special educational needs. Tobin (1994) describes the potential use of the standard British Ability Scales (BAS) for assessing children with low vision. He notes that scores must be treated cautiously, as many children with low vision find it difficult to access a number of the sub-scales. Nevertheless, the difficulty of access provides "educationally significant information about the kinds of difficulties such pupils may experience" (p. 57). The balance is also noted by Erin and Koenig (1997) in their analysis of assessment tools for establishing whether a given child with a visual impairment has a learning disability or not. Arguably, it is also reflected in a survey of special schools for visually impaired children in the United States carried out by Miller and Skillman (2003). They found that while there was widespread use of tests developed for a sighted population there were high satisfaction rates for specially developed assessments (for example the Oregon Project for Visually Impaired and Blind School Children). In contrast, Hannan (2007) carried out a similar survey and concluded that there was a high dissatisfaction with assessment

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procedures and their appropriateness for visually impaired pupils (especially given the important role they play in individual education plans in the United States as well as the imperative to demonstrate educational progress).

Two recent and relatively large-scale studies are in the area of reading test development (Greaney et al. 1998; Douglas et al. 2002), dealing with adaptations made to the Neale Analysis of Reading Ability (NARA—a reading test for normally sighted children aged 6 six and 13). The authors aimed to generate norm scores for both Braille and print readers. Douglas et al. (2002) tested the reading of 476 children with low vision, using an unmodified print version of the NARA. The data showed that the average reading ages for accuracy, comprehension and speed for the sample are generally below their chronological age when the comparison is made with their fully sighted peers. A fuller analysis and presentation of standardised scores is presented by Hill et al. (2005).

Greaney et al. (1998) tested the reading of 317 Braille readers (in the UK and Ireland) using a Braille version of the NARA. As in the study with low vision, the data showed that the average reading ages for accuracy, comprehension and speed for the sample are generally below their chronological age when the comparison is made with their fully sighted peers (and low-vision readers). Again, the size of the "lag" increases with age. In the case of Braille, however, there appeared to be a greater lag in reading speed.

Hull and Mason (1993, 1995) developed a specialised tactile version of a test for speed of information-processing, working with 318 children in the UK and Ireland. A significant finding was that the speed of access of the blind children was considerably less than that of sighted children using print versions of the similar test (two to three times slower, depending on the format). Ballesteros et al. (2005) have carried out more recent work on tactual ability.

4.2.5 Assessment of children with MDVI

McLinden and McCall (2002) note that the assessment of children with multiple disabilities and visual impairment needs to be "an ongoing process of discovery about the child" (p. 81), which guides the intervention approaches to be adopted. Given the dearth of dedicated procedures for children with MDVI, pre-school assessments are often used with these children (for example Reynell-Zinkin Scales), and this is likely to be the case also for the

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Developmental Journal described by Dale and Salt (2007). However, these procedures can be inappropriate and insensitive approaches, and Best and Bell (1984) in their analysis of twelve assessments for use with children with MDVI noted that none of the assessments alone was wholly adequate. This view is supported by McLinden and McCall, who comment that assessors need to "have an appreciation of the range of sources that can provide information about the child and a framework in which to analyse that information" (p. 81). An example of a suitable framework for such analysis is Vision for Doing (Aitken and Buultjens 1992), which, as noted above, was specifically developed for use with children who have MDVI. The assessment (and linked educational activities) are divided among seventeen sections (four of which are not linked to aspects of vision, making aspects of the tool relevant to children who are totally blind or have very severe visual impairment).

4.2.6 Summary

"Access" to assessments (related to modality of presentation) is a challenge to visually impaired children (and their educators). One strategy adopted by many commentators, users and developers of assessments is to adapt existing "mainstream" assessment procedures. This has been done formally (for example through the generation of standardised print reading scores using the NARA) and informally (for example by using and modifying existing assessment procedures cautiously). A key consideration is the additional time required by visually impaired children to carry out some assessments. Another strategy is the development of specialist assessment procedures that assess aspects of development that are *particular* (for example Braille reading) or *particularly relevant* (for example tactual perception, visual perception) to visually impaired children.

A small but significant range of educational assessment procedures has been empirically developed for children with visual impairment (at pre-school and school age and for children with MDVI). It is noted that the process of assessment requires training and experience on the part of the administrator, particularly if a sound interpretation of the results is to be made. In many cases assessments also draw on the observations of others. (For example, observations of parents and class teachers is particularly highlighted as important in the assessment of young children and children with MDVI.) Linked to this is the understanding that assessments do not stand alone and are best understood when used in conjunction with assessments from

a broad range of stakeholders. Recent literature from the United States calls for the development of more appropriate assessment tools for visually impaired children.

Key points

- "Access" to assessments is a challenge for visually impaired children (and their educators). A significant challenge is presented by the presentation format of assessment procedures and the interpretation of the results, particularly when procedures are standardised on the general population.
- Professionals can make use of the limited available specialist procedures or use mainstream assessment tools cautiously.
- Professionals require training in the use and interpretation of these assessment tools.

4.2.7 Recommendations: Assessment of learning needs

Given the challenges posed by access to assessments for children with visual impairment, professionals involved in assessment should

- ensure that they are cautious in their use and interpretation of mainstream assessment tools when they are applied to children with visual impairment;
- where appropriate, make use of specialist procedures designed for children with visual impairment (for example the assessment of Braille reading).

Consideration should be given to providing training opportunities to ensure that professionals are competent in using and interpreting assessment tools for children with visual impairment.

Consideration should also be given to developing new (or modifying existing) specialist assessment procedures for specific use in Ireland.

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4.3 Pedagogy and teaching strategies

4.3.1 Introduction

In a review of the pedagogical needs of learners with a visual impairment, Douglas and McLinden (2005) made a distinction between "macro" and "micro" teaching strategies. While "macro-strategies" were considered to be those at a higher level and were typified by broad teaching approaches (for example the provision of practice to achieve mastery), "micro-strategies" were considered to be particular modifications of macro-strategies (and subordinate to them). The review noted:

> It would seem then that there is little or no evidence that there is a distinct macro-pedagogy for children with a visual impairment. At a micro-strategy level of teaching we can identify evidence of a group difference position which has its basis in access to the curriculum, and results in specific approaches which must be taken when teaching children with a visual impairment.

The review highlighted that teachers will need to draw on micro-strategies in their teaching to make it appropriate to visually impaired children. Of central importance are the following points:

1. The teaching strategies are necessarily sensitive to the modality of the interaction, because of the children's impaired vision (i.e. its accessibility).
2. This can be done by either enhancing the visual mode (for example enlarged print) or using alternative presentations (for example though speech or tactiles).
3. It should be noted that such micro-strategies may take longer than (or have different qualities from) traditional teaching strategies (most obviously, they may be slower).
4. The distinctive needs of children with visual impairments has given rise to an additional curriculum considered to be either "over and above" the mainstream curriculum (e.g. Arter et al. 1999) or areas that are outside the mainstream teacher's expertise (e.g. Spragg and Stone 1997) and require the involvement of professionals with specialist training or knowledge (for example specialist teachers or mobility officer) (Douglas and McLinden 2005).

For the purposes of this literature review we have focused on highlighting examples of research literature that illustrate different settings in which particular teaching approaches are required. In the majority of cases the literature is based on case studies that offer examples of teaching approaches often linked to specific curriculum areas. The examples given relate to PE, music, and science, but there is similar literature for other curriculum areas. There is also a large base of "teacher literature", which contains descriptions of pedagogical practice that is not featured here, as it was beyond the remit of the review. Some important areas of the curriculum (literacy) and the additional curriculum (mobility and independence, ICT, low-vision training, and social and emotional inclusion) are excluded from this part of the literature review, as they have their own section.

4.3.2 Curriculum areas

In the area of PE, Wiskochil (2007) successfully used peer-tutoring techniques (i.e. involving sighted peers to support visually impaired students during the lesson) to improve the engagement and performance of visually impaired students in mainstream PE lessons. Interestingly, more successful interventions were reported when the peer-tutors had received a short training session on the support they should give. A contrasting study by Ponchillia (2005) describes a short-term intervention that taught sports to children with visual impairments in a group (and away from mainstream groups). The substantial study (321 participants) showed improved performance in and attitudes towards sport following intervention. The teaching strategies described in both interventions included hierarchical verbal cues, demonstration, physical guidance, tactile modelling, guide runner, equipment adaptations, and the inclusion of specialist sports activities (for example tandem cycling). Ponchillia (2005) argues that full access to sport is not possible within the normal school environment and that short-term interventions of the type described are essential. Lieberman (2006) provided a detailed description of modifications and the effort and skills required on the part of teachers (and students) to include students with visual impairments in physical education. Tactile modelling and physical guidance as teaching strategies are explored and described in detail by O'Connell et al. (2006), who conclude that they are effective methods of improving the motor skills and physical activities of students who are blind. They

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highlighted that it is imperative that the issues of personal space, fear of liability and lack of one-to-one instruction should be anticipated and overcome.

In the area of music, Corn and Bailey (1991) described the approaches to teaching music in American residential schools for visually impaired students. Clark and Murphy (1998) reflected upon how these types of approach could be adapted to mainstream schools.

Science education presents similar specialist approaches to teaching. Brown (1997) describes using models and tactile diagrams to teach biology. Hinton and colleagues presented a series of papers evaluating the use of tactile diagrams in science education (Hinton and Ayres 1986; Wild and Hinton 1993; Wild and Hinton 1996) — the diagrams giving accessible presentations of visual graphs, cross-sectional diagrams, flow diagrams, etc. Earlier papers describe case studies that demonstrate adaptations and modifications to teaching strategies: for example, a series of six papers by Franks described methods of teaching concepts of measurement, mechanics, temperature, and identifying insects (Franks and Butterfield 1977; Franks and Huff 1977). More recently, Jones et al. (2006) described the use of haptic (simulated tactile feedback and kinaesthetics) instructional technology for teaching cell morphology and function to middle and high-school students with visual impairments. The results showed that students made significant gains in their ability to identify cell organelles and found the technology to be highly interesting as an instructional tool.

Preparedness on the part of teachers is emphasised by many commentators. Lieberman (2002) surveyed physical education teachers about the barriers to including children with visual impairment in lessons; professional preparation was identified as the dominant barrier. Ponchillia (1995) provided details for modifications and adaptations of a range of sports. Similarly, Penrod et al. (2005) describe how the training of science teachers and special-education teachers was carried out together as part of a week-long training programme. Outcomes suggested that the programme had a positive impact on confidence in teaching science and strategies for teaching with visually impaired children.

4.3.3 Children with MDVI

As well as the teaching of curriculum areas to visually impaired students, another theme that emerged was that of particular strategies for teaching children with MDVI. As an example,

Trief (2007) described the successful use of "tangible cues" when teaching children with MDVI and limited to no verbal skills. Tangible cues (similar to "objects of reference" in the UK or European context) refer to three-dimensional tactile objects that can be manipulated easily and possess concrete qualities, such as shape, texture, and consistency, that link to the concept or object they represent. Similarly, McLinden and McCall (2002) provide an overview of tactile symbols used with children who have MDVI.

An important aspect of some of the teaching strategies in relation to children with MDVI is the modification of general approaches to the very specific needs of a given child. An illustrative example is presented by Lund and Troha (2008), who described the successful

implementation of a modified "picture exchange communication system" (PECS) teaching protocol with tactile symbols with three children who were blind and autistic.

4.3.4 Summary

Much of the empirical work in this area is drawn from case studies, providing strong evidence in support of the "craft" of teaching children with a visual impairment (and in particular teaching children with severe visual impairment or who are blind). This craft tends to draw on the broad strategies of using either alternative or enhanced modalities of presentation and communication. However, the articles highlight the complexity and subtlety of some of the techniques described, for example the use of verbal cues, verbal description, models, tactile modelling and demonstration, tactile symbols, etc. Another important aspect of the literature is that it often draws on new technology and specialist equipment (for example speech-based calculators or embossing machines) and, in the case of sport, may result in alternative and specialist activities (for example goalball).

In the summing up of their review of the pedagogical needs of learners with a visual impairment, Douglas and McLinden (2005) noted that some presentations are simply less practicable than others (for example providing real examples or 3D models). They also noted that the teaching and learning may be necessarily slower, and perhaps the greatest implication of this is the reduction in time available for students to do other things, including practice. With regard to those who teach, it also follows that there are implications for how

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the learning can be managed in mainstream classrooms and the training these professionals need in order to become skilled in these teaching strategies.

Key points

- The "craft" of teaching visually impaired children tends to draw on two broad pedagogical strategies that involve using "alternative" or "enhanced" modalities of presentation and communication (for example the use of a tactile diagram as an *alternative* to a printed diagram, the use of a low-vision aid to *enhance* the print size, etc.).

- Without these strategies, access to the curriculum by visually impaired children would be compromised or even denied.

- These adapted methods of teaching may require more time than conventional teaching strategies (partly because children with visual impairment generally require more time to process information and to complete tasks).

- Some aspects of the curriculum may require significant modifications to enable access by children who are visually impaired (for example Braille literacy).

- Many children who are visually impaired require an "additional" curriculum that is "over and above" the mainstream curriculum (for example mobility and independence education, Braille tuition, daily living skills, etc.).

4.3.5 Recommendations: Pedagogy and teaching strategies

To ensure appropriate access for children with visual impairment, educational services with responsibility for curriculum design and delivery in Ireland will need to

- incorporate pedagogical strategies that are structured around "alternative" or "enhanced" modalities of presentation and communication;

- recognise that these adapted methods of teaching may require more time than conventional teaching strategies;

- ensure that due consideration is given to areas of the "additional" curriculum that are "over and above" the mainstream curriculum (for example mobility and independence education, Braille tuition, daily living skills, etc.).

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4.4 Access to public examinations

4.4.1 Introduction

The formal assessment of children through public examinations is a central feature of most education systems. Nevertheless, standard examination formats and procedures may present barriers to visually impaired pupils, which means that they cannot demonstrate their abilities under standard examination conditions. There appears to be no systematic international analysis of how examination procedures work for visually impaired students. However, it should be noted that in the UK the RNIB is in the process of commissioning such an analysis in order to propose modifications to the present English system. The estimated date for completion is 2009 or 2010.

4.4.2 UK context

While relatively little literature on this subject appears in the literature databases, the research team was able to identify some literature in relation to systems in the UK. Cobb (2008) offers the most substantial overview of the system in England and Wales (as well as a history of its development). The central mechanism is "access arrangements", whereby examination "modification" or "enlargement" is requested from examination boards (at present four in England) for particular arrangements for *individual* students before their examination. A limited choice of modifications is available, including enlarged text, enlarged modified text, and Braille modified.

The process of "modification" is perhaps the most contentious, as it involves changing the wording—or even the content—of questions to enable access. Traditionally, examination boards appear to have made pragmatic decisions, case by case (generally relying on the wisdom of experts who they commissioned to modify papers when requests are made). Nevertheless, these systems are under scrutiny at the time of writing, partly because of disability legislation in the UK (discussed further below). Cobb's (2008) work has shown that the present system in England for large-print modification does not work very well for GCSEs (examinations at the age of sixteen) and appears to be particularly problematic when offered to mainstream pupils. In part this is because there are four examination boards that provide English GCSE examinations and curricular mechanisms for national standardised

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examinations (the SATS in England seem to fare better because of economies of scale: *all* pupils at a given age take the same examinations). There is also some evidence that teachers do not understand the mechanisms for examination arrangements, the modifications made by examination boards are inconsistent, and the choices of examination format (in effect large type, of 18 or 24 point, or Braille) are inadequate for meeting the needs of the pupils.

Miller et al. (2005) reviewed the literature on accessible curricula, qualifications, and assessment. The review was linked to disability generally, though it did draw on examples related to visual impairment. The authors made a distinction between "access arrangements" and "universal design": the former means that the adjustments are "post hoc", while the latter means that adjustments are built in to the design of the assessment rather than added on later:

> A prominent example of post hoc provision is evident in the field of visual impairment, where papers in large print are produced in a limited range of print sizes on the basis that this is the most that the Awarding Bodies can afford. Research conducted by Buultjens et al. in 1999 undertaken in the hope of identifying an optimum print size for exams taken by candidates with visual impairment reached the conclusion [that] each student should be presented with his or her optimum print characteristics for exam papers. The issue rankles considerably among candidates themselves and their teachers. Cobb (2002) describes their views as follows: 'Many teachers of the visually impaired argue that, by limiting the range of alternative formats available for examinations, we are denying some children the opportunity to demonstrate their knowledge, skills and understanding properly.' … The most common criticism mentioned was the quality of modified large print papers—in this case, not the size of print but the poor standard of proofreading brought about by the fact that many modified papers are produced at short notice in the last few weeks before the exam. (Miller et al. 2005, p. 56–57)

4.4.3 Other contexts

The English system described above is perhaps more akin to a "post-hoc" access arrangements approach. Similarly, Steer et al. (2007) used the term "assessment accommodations" (similar to "access arrangements") in the context of Australia (and to some

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extent the United States). They make a distinction between five different types of accommodation: presentation-related, time-related, setting-related, response-related, and aids-related. The paper provides a useful framework but no evaluative data. Knowlton et al. (2003) describe the methods adopted in the state of Minnesota (arrangements appear to be made at the state level in the United States). Again these seem to follow an access-arrangements approach, involving the presentation of modifications to a reviews committee.

By contrast, Papadopoulos and Goudiras (2004) describe a solution developed in Greece in which visually impaired university students used specially designed software to gain access to examination papers (using screen reading software). This work has resonance with a "universal design" approach described above, as has a recent pilot study described by Nisbet in Scotland. Nisbet (2007) describes the "SQA Adapted Examination Papers in Digital Format":

> Digital question papers for candidates with additional support needs were used for the first time in SQA examinations in 2006 with considerable success. We believe that SQA are the first examination authority anywhere to have developed and used such digital papers for candidates with additional support or special educational needs. Candidates who used the digital papers in 2006 preferred them to readers and/or scribes, while staff felt that candidates were more independent, confident and motivated with the digital papers than with traditional methods of support. Analysis of attainment by SQA suggests that the digital papers did not influence the marks achieved by the candidates. The pilot was repeated on a larger scale in 2007 and 80 candidates from twelve centres requested 490 digital papers for use in 200 entries. The results of the 2007 trial confirm the findings obtained in 2006 and enabled SQA to develop and test digital paper production and distribution on a larger scale. Digital question papers offer a more independent and appropriate method of support to candidates with additional support needs who have difficulty with standard papers. (p. 5)

The Scottish system allows the production of electronic papers in which the candidate can (in principle) modify the presentation to their own preference (although this was tested with "print-disabled students," which included some visually impaired pupils).

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4.4.4 The Irish situation and summary

Approaches to providing access to examinations for visually impaired pupils appear to follow one of two broad philosophies: "access arrangements" and "universal design". The latter may offer more elegant solutions than the former. Current work in Scotland and developments in England (through RNIB initiatives) seem to explore these "universal design" solutions. Current methods described by the Advisory Group on Reasonable Accommodations (AGRA 2007) in Ireland seem compatible with these approaches, though a close analysis of how the framework can be put into operation may be appropriate. AGRA (2007) refers to the report of the Expert Advisory Group on Certificate Examinations to the Minister for Education and Science (EAGCE 2000), which proposed thirteen principles that should be considered in the provision of special arrangements for candidates with SEN in state examinations. These principles included the importance of determining the nature of special arrangements for individual candidates while at the same time maintaining the integrity, status and reputation of the examination itself. It is interesting to note that the EAGCE considered visual and hearing impairment to be physical disabilities rather than sensory disabilities. For the 2009 examinations (State Examinations Commission 2008—which again refers to EAGCE 2000) the following reasonable accommodations were available, based on successful application on the grounds of physical, hearing or visual difficulties:

- the use of a mechanical aid such as a word-processor
- the use of a mechanical aid such as a tape recorder
- access to a scribe
- access to a reader (visually impaired and hearing-impaired only)
- Braille version of question papers
- text version of the Braille question papers
- enlarged versions of the question papers (although this appears to be limited to photocopy enlargement from A4 to A3 size)
- extra time for the visually impaired
- the use of a personal CD in the main centre
- the use of a separate centre for the aural examination
- the use of a separate centre
- exemption from the aural examination

- modified aural examination
- combined oral and aural examination
- exemption from oral examinations.

In addition, the use of low-vision aids can be arranged by the school without reference to the State Examinations Commission (State Examinations Commission 2008). However, students do not appear to have the option of access to electronic versions of examination papers that is available in many other countries (for example Scotland).

Most of the arrangements described above would appear to be "post-hoc" modifications of the established examination system, as opposed to accommodations within a universal design structure, as debated by Miller et al. (2005). However, it should be noted that the EAGCE (2000) did recommend that the time element of the examinations be considered and suggested that all candidates be given an extra fifteen to twenty minutes in some of the core examinations so as to protect the integrity of the examination while at the same time meeting the needs of some students. This suggestion appears to move closer to the universal-design approach. This suggestion was raised again by the Advisory Group on Reasonable Accommodations (AGRA) (2007) in relation to subjects with a heavy language content, and indeed they raised the question of consideration of a more flexible approach to the issue of time generally as an accommodation. As things stand, additional time is possible for students with a visual impairment based on application.

The National Council for the Blind of Ireland (NCBI) made a submission to the AGRA (2007) which queried the consistency of actual provision of accommodations on the day of the examination. They raise concerns regarding lack of clarity in relation to what it is permissible to use in examinations, lack of follow-through on what is requested, and difficulty in completing the application form because of the layout (NCBI 2007).

Key points

- Ensuring that visually impaired pupils have access to public examinations requires careful planning.
- Procedures described by the Advisory Group on Reasonable Accommodations (AGRA 2007) appear to be in line with international views on access to examinations

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and provide the framework for giving access to public examinations by visually impaired pupils.

- It may be helpful to review the implementation of these procedures to ensure that the access needs of children with visual impairment are met, particularly given the emergence of alternative approaches in other countries (for example the use of digital question papers in Scotland) and recent questions raised about the procedures in Ireland by the NCBI.

4.4.5 Recommendations: Access to public examinations

The procedures described by the Advisory Group on Reasonable Accommodations (AGRA 2007) offer a suitable framework for considering the public examination access needs of pupils with sensory needs. It is recommended that reference be made to this framework in reviewing the particular access needs of children with a visual impairment in Ireland to ensure that their needs are met. An exploration of the use of digital question papers may also be helpful (as in Scotland).

4.5 Print literacy

4.5.1 Introduction

The literature on print literacy can be split into the following overlapping themes:

- Reading performance
- Choices of print format
- The role of technology (including low-vision aids)
- The teaching of literacy

4.5.2 Reading performance

Douglas et al. (2002) and Hill et al. (2005) observed delays in speed, accuracy and comprehension of print reading among British children with low vision. They made a distinction between developmental delays in reading and difficulties in access to text, arguing that long-term difficulty in accessing text leads to developmental delays. Others (most

notably a series of studies by Gompel and colleagues, e.g. Gompel et al. 2004) found that, despite their lower reading speed on a reading-comprehension task, the children with low vision comprehended texts at least as well as sighted children. Nevertheless, Gompel et al. (2002) noted that decoding (comparable to Douglas et al.'s "reading accuracy") was also delayed compared with normally sighted children. Similar mixed findings are found in the analysis of print reading errors: Douglas et al. (2004) and Cornelissen (1991) noted that children with low vision made particular types of errors (although comparison between the two studies is difficult), while Bosman et al. (2006) and Corley and Pring (1993) did not find this.

In practice there are probably trade-offs between reading accuracy, speed, and comprehension: because of the effort children with visual impairment have to make in decoding (and the time this takes) there is often an impact on reading comprehension.

4.5.3 Choices of print format

A number of studies have looked into various aspects of print format. For example, Buultjens et al. (1999) investigated print size and font, while McLeish (2007) investigated letter-spacing. Such studies do make some recommendations for best format for the study sample (for example Buultjens et al. described 24-point size and font Helvetica or Arial as the most "generally accessible" of those they tested).

However, a significant observation is that regarding the individual differences among participants. Perhaps in keeping with this are the findings of the review by Russell-Minda et al. (2007) of research evidence on the effects of the characteristics of typefaces on the legibility of text for adult readers with low vision. Their review identified no consistent findings. This lack of clarity (i.e. an inevitable failure to identify a "one format fits all" solution) leads to tensions with some strategies for access (for example enlarged examination papers, as reported by Cobb 2008).

Perhaps a more profitable approach is to find methods of understanding an individual's needs. For example, Hall-Lueck et al. (2003) and Bailey et al. (2003) give detailed descriptions of how to determine print size requirements for a low-vision reader. This involves measuring reading speed for different print sizes to determine the smallest size for the maximum speed (the "critical print size"). However, such an assessment must account for preferred (and

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comfortable or sustainable) viewing distance, different tasks (for example sustained reading versus short-term reading), and the individual's reading ability. Such an analysis should also then consider the mechanism by which print size is achieved (by manipulating the size of the actual printed text or by using a magnifier of appropriate strength to increase the text size).

4.5.4 The role of technology (including low vision aids)

Low-vision aids (LVAs), closed-circuit television (CCTV) and electronic magnification (most notably computer-based magnification software) are extensively cited in the literature as useful techniques for enabling low-vision print readers (including children) to establish optimal print size (and therefore to access print efficiently). Good-quality task lighting is also commonly cited as a key method of improving reading efficiency (e.g. Fosse and Valberg 2004 in relation to older people).

Papadopoulos et al. (2005) provide an overview of screen magnification software and its benefits. Corn et al. (2003) offer an overview of the literature in relation to LVAs and provide an analysis of cost-effectiveness that supports the use of LVAs over the provision of large-print material. They argue that the use of LVAs provided a more "elegant strategy" than large print, in that teaching students to use LVAs meant they could have access to standard print without having to rely on other equipment and other people to prepare material for them. It is perhaps this argument that LVAs provide users with "independent" access to print that dominates the literature, with a number of empirical studies providing evidence that LVAs can be used successfully by children to read efficiently, given practice. As an example, Corn, Wall et al. (2002) present a study showing that children who received optical devices increased their silent reading speeds and comprehension rates. Other studies offer evidence of this kind (e.g. Smith and Erin 2002). A review of studies comparing LVAs plus normal print with enlarged print was carried out by Lussenhop and Corn (2002). They concluded that the eight key studies they identified "point strongly toward a conclusion that reading standard print with optical devices is as effective a literacy medium as large print—and perhaps a more effective one" (p. 67). The authors note that LVAs are not always the appropriate solution, but even so they feel it is important for teachers and students to re-examine "assumptions and traditional reliance on large print" (p. 68).

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Arguably, implicit in the literature on the topic of LVAs and teaching is a belief that print enlargement or modification is used in schools in preference to standard print in combination with LVAs. There is relatively little literature that actively argues in favour of print enlargement or modification. An exception is Frank (2000), who argues that people have a right to get enlarged print formats under the Americans with Disabilities Act (and the paper presents case studies of people not receiving such modifications). Perhaps this highlights a tension between educational approaches and contemporary policy directions in relation to disability; arguably the former would emphasise teaching students access skills (i.e. how to use LVAs), while the latter would emphasise providing materials to optimise access (i.e. the provision of bespoke large print).

In the more relevant area of education this tension between print modification and the use of LVAs is illustrated most clearly in a study by Mason (1999), which examined the use of LVAs by pupils with a visual impairment in UK mainstream secondary schools. It was noted that the use of LVAs was relatively low, and the reasons for this low take-up were examined. Peer pressure from other pupils was a major reason for the rejection of LVAs. Similar findings were reported by Franklin et al. (2001): the take-up of LVAs was low and pupils reported that LVAs made them feel "different" (p. 112). Mason (1999) also noted that it was clear that not all teachers had clearly defined criteria for judging whether LVAs were being used effectively. Cobb (2008) also drew attention to differing (and fluid) opinions of trainee specialist teachers on the use of large print or LVAs to aid access to print.

4.5.5 Teaching of literacy

Some issues related to teaching are highlighted implicitly in the studies reported above (for example knowledge of the features of print reading by low-vision readers, use of LVAs, method of assessing optimised print size, etc.). Koenig and Layton (1998) described a small study in which elementary-school children were taught to undertake repeated reading of text (i.e. practice) and looked at how it improved reading fluency and was transferred to the classroom context. Fridal et al. (1981) described a similar study. Beyond this, much of the literature on the teaching of literacy is captured in general texts in the field of visual impairment (e.g. Mason et al. 1997; Corn and Koenig 1996). These are generally edited texts and draw on "experts" who have been involved in education and visual impairment who

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describe their "craft". To this extent they tend not to be empirical studies. Nevertheless this is a rich corpus (discussed in greater detail in the "Pedagogy and teaching strategies" topic and elsewhere).

However, Corn and Koenig (2002) provide an empirical approach that captures this expert teaching knowledge. Their study uses the "Delphi method" with forty experts in teaching literacy skills to students with low vision. Corn and Koenig's study is a rare example of a formal empirical approach to describing a curriculum area for visually impaired children and the types of intervention (consultant or direct) and levels of intervention (including intensity, duration, and commencement). Literacy and low vision is split into eleven areas: emergent literacy skills; integrated use of visual skills; use of optical devices in near environments; use of optical devices in distance environments; beginning print literacy skills; intermediate and advanced print literacy skills; beginning literacy skills in dual media; Braille literacy skills for students with print literacy skills; listening, aural reading, and live-reader skills; keyboarding and word-processing skills; and technology skills. The two areas related to Braille are revisited elsewhere in this review.

Corn and Koenig's study may be a useful point of reference when considering teaching services (including those in Ireland).

4.5.6 Summary

Reading can usefully be thought of as being composed of three components: speed, accuracy, and comprehension. There is broad agreement in the literature that children with low vision read more slowly and less accurately than normally sighted children. Some researchers argue that children with visual impairment also have delayed comprehension, which is linked to general delay in reading development, while others argue that the essential problem is speed and access and that given enough time visually impaired children would match the reading comprehension of sighted children. In practice there are probably trade-offs between reading accuracy, speed, and comprehension: because of the effort children with visual impairment have to invest in decoding (and the time this takes) there is often an effect on reading comprehension.

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Print enlargement (and general modification to text, for example font, spacing) is a common and successful technique for increasing access to print for children with low vision. Perhaps inevitably, there is little clarity about which print size is best for most efficient reading among the population. A richer source of literature is that related to the assessment of the optimal size of print for individuals at a given time (and how this print size is achieved, whether through enlarged or the use of magnification). A tension may exist with strategies of establishing individuals' optimal print size and broader policies in relation to preparing standard materials in standard formats.

The literature highlights the use of technology (especially LVAs) as a key technique for giving children with low vision efficient access to print. Many authors describe interventions for teaching the use of LVAs, and some studies demonstrate that efficient reading (comparable to enlarged print) can be achieved. Evidence suggests that the take-up of LVAs in the classroom is mixed. The key barriers appear to be students' attitude and teachers' awareness of or confidence in the approach. Some of the underlying causes of the latter may be confusion between education agendas and disability policy agendas: the former may be seeking to teach children life skills for more long-term benefits, while the latter may be seeking to optimise access at that particular time. Even so, overcoming young people's anxiety about looking different from their peers when using LVAs remains a challenge.

Empirical research literature tends to provide details about visually impaired children's literacy development and results in relation to very specific interventions (such as the use of LVAs, or particular print formats). Broader literature in relation to the teaching of literacy to children with low vision tends to be expert views and is relatively scarce.

Key points

- Reading can be usefully thought of as including three key components: speed, accuracy, and comprehension.
- Children with low vision tend to read print more slowly and less accurately than normally sighted children, and this can also have an impact on comprehension.

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- General "print enlargement" is a common and successful technique for increasing access to print for children with low vision. Establishing a child's optimal print size is an important aspect of functional vision assessment.
- The use of low-vision aids (LVAs) has the potential to be an efficient and successful method of print enlargement (and therefore access) for many visually impaired children. While large print (i.e. large text presented on paper) is a useful technique in some circumstance, teaching children to gain access to standard print using an appropriate LVA is often a better solution.

4.5.7 Recommendations: Print literacy

Given the particular challenges children with visual impairment face in accessing print literacy, specialist services with responsibility for supporting their education will need to

- ensure that a child's optimal print size is established as part of a functional visual assessment;
- recognise that, while teaching children using large print (i.e. large text presented on paper) is a useful technique for providing optimal print size in some circumstances, priority should be given to teaching children to use low-vision aids (LVAs) effectively to optimise their access to print.

4.6 Braille literacy

4.6.1 Introduction

There is a strong belief, pervasive throughout the literature written by professionals in the field, that the denial of Braille to children who need it leads to major educational disadvantage, and that auditory input alone cannot compensate for lack of Braille. Most of the empirical research into the literacy development of children with a visual impairment has focused on reading rather than writing. The literature on Braille literacy can be split into the following overlapping themes:

- Reading performance
- Decisions on Braille format

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- Teaching literacy through Braille
- The role of technology
- Literacy through touch for visually impaired children with additional complex needs

4.6.2 Reading performance

Greaney et al. (1998) tested the reading of 317 UK Braille readers using a Braille version of the NARA (Neale Analysis of Reading Ability)—a popular reading test developed for sighted children that tests reading speed, accuracy, and comprehension. The data showed that the average reading ages for accuracy, comprehension and speed for the sample generally fall below their chronological age, and lag behind both fully sighted and low-vision readers. The size of the "lag" increases with age. In the case of Braille, however, the area of greatest lag was found in reading speed. The disadvantages of the reduced speed of information-processing increase as children move through the education system.

The case for the differences in performance in Braille reading is relatively well established. One seemingly obvious but nevertheless crucial difference when comparing the reading performance of sighted with tactile readers is that while "the eye can easily take in a whole word at a glance, the finger can only take in one character at a time" (McCall 1999, p. 38). This "letter-by-letter" approach to Braille reading has resulted in the development of reading schemes that have been reliant on phonic approaches rather than on whole-word recognition or "look and say" methods in the early stages of reading. Differences in reading print and Braille have given rise to what Greaney et al. (1998) describe as "Braille-specific errors" (p. 24) in the reading process, and this finding is supported by Miller (1996), who states that children "acquire *different* strategies to those which sighted children would use when learning to read print" (p. 50; emphasis added).

In part, evidence for these differences is a somewhat obvious consequence of using a different code and, more importantly, a different sense (i.e. touch rather than sight). Even so, careful observation by researchers and practitioners has generated a sophisticated knowledge base of Braille reading, including types of error that are particular to the Braille code (such as reversal, rotation and alignment errors), efficient hand movements, and correct posture (e.g. Greaney et al. 1998; Millar 1997; Olson and Mangold 1981).

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Some researchers have found evidence for delay in the development of phonological awareness among children who are Braille readers. For example, Gillon and Young (2002) compared the phonological-awareness skills of nineteen New Zealand children who are blind and were using Braille as their reading medium with those of a control group of sighted children of the same reading age but who were three years younger. Children who had difficulty reading Braille were delayed in their development of phonological awareness, demonstrating strengths and weaknesses that were similar to those of the younger, sighted children.

However, Monson and Bowen (2008), in a review of research on the development of phonological awareness by Braille readers, found that the relationship between phonological awareness and Braille is uncertain, because of the lack of commonality among the studies, the extent of contradictory findings, and the small number of studies involving beginning Braille readers.

Evidence regarding the written spelling skills of Braille readers is less clear-cut, although recent studies suggest there is no significant difference in spelling performance between Braille and print readers. For example, Clark and Stoner (2008) compared the spelling skills of students who are Braille readers with a normative sample. The Test of Written Spelling was administered to twenty-three students who were blind at various grade levels to ascertain their spelling ability. A one-sample t-test indicated no significant difference in spelling ability.

4.6.3 Decisions on Braille format

Decisions about which format to use with children who have severe visual impairment are inherently difficult and are affected by a number of considerations, for example the degree of vision loss, prognosis, efficiency of vision use, and parental preference (Corn and Koenig 2002). Koenig and Holbrook (1995) and Koenig (1996, 1998) provide detailed guidelines for practitioners on selecting appropriate reading media for children with severe low vision.

In the case of children who are print users and who experience deteriorating vision the question becomes one of "when and how" rather than "whether" to introduce Braille; and the decision can be a "profoundly emotional" one (e.g. Wormsley and D'Andrea 1997).

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4. Review Focus: Classroom and the Curriculum

Only a relatively small proportion of children require access to both Braille and print: most will focus on one medium. Children who learn to read through print and then require transfer to Braille have different needs from children learning to read through Braille from the beginning (McCall 1997).

A recent UK study by Rogers (2002) found only 107 children who used both print and Braille for reading or writing. This constituted approximately 17% of the population of children aged between five and sixteen who used Braille. Rogers suggested that, because visual processing is faster and more efficient than tactile processing, print initially may be the preferred format, particularly in reception classes, where children are not required to process large amounts of information. Almost all the children (86%) had begun by learning print in reception class, but by the age of seven 54% had also been introduced to Braille.

Rogers found that children did not use Braille and print in equal amounts and identified three groups: predominantly print users, predominantly Braille users, and children who appeared to use both print and Braille successfully. Some children who were predominantly Braille users preferred to use print for curriculum areas where there were relatively small amounts of text to process (for example maths).

In the same study, teachers saw parents' attitudes as a significant element in the decision whether children who used print accepted Braille and reported that positive attitudes to Braille among parents, class teachers and learning assistants were essential if Braille was to be introduced successfully. Although decisions about dual Braille and print use were usually taken individually, some authorities actively discouraged simultaneous instruction in print and Braille and applied a policy that children should learn through one medium or the other.

Lusk and Corn (2006) note that a single-medium policy was common in the United States in the 1980s but that dual use was now seen as a positive advantage for some children. They studied dual-media learners in the United States and explored the instructional methods and curricular decisions of teaching dual media to students with low vision and reported the students' present literacy levels and reading rates and their teachers' expectations for future levels of literacy. They found a generally positive attitude towards both print and Braille among the students.

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Only half the students who used dual media had progressively deteriorating eye conditions. Only 15% used standard print with optical devices as their primary reading medium. In addition, 49% used large print, 19% used Braille, and 18% used standard print without optical devices as their primary reading medium. All the students used at least one method of accessing print and were learning or using Braille. Like Rogers, Lusk and Corn (2006) found that most children had been introduced to Braille by the age of seven.

Another area of debate in the choice of Braille media relates to the use of uncontracted (grade 1) Braille and contracted (grade 2) Braille, particularly in the early stages of reading. Since the 1970s grade 2 Braille has been commonly used in the UK as the medium of instruction for young Braille readers. Troughton (1992) found that a small group of blind students in Canada who learnt contractions later in their school years had superior reading skills to those who learnt contractions early. There have been some recent studies into the practice of introducing reading through uncontracted Braille. Hong and Erin (2004) compared the reading and spelling skills of students who were taught to read using uncontracted Braille with those of students who were taught to read using contracted Braille. They found no significant differences in performance over a range of skills, such as reading speed, reading accuracy, comprehension, and spelling ability, between initial instruction in the two types of Braille.

Clunies-Ross (2005) summarises the debates in the United States over the use of grade 1 Braille, noting its increasing use with particular groups, including beginners of all ages, children with learning difficulties, mainstream teachers, and parents. She reports that grade 1 Braille is seen as an additional option rather than a replacement for grade 2 Braille, with learners making the transition from grade 1 to grade 2 at some stage in their learning.

Clunies-Ross notes concerns in Canada about the lack of books in grade 1 Braille for early learners and anxieties because there are no guidelines to help teachers of students make the transition from grade 1 to grade 2. She also reports a "heated" debate about whether to teach grade 1 or grade 2 to beginning users in Australia. She notes that in integrated classrooms grade 1 is perceived as easier to teach and manage but that there are concerns that staff members who have only grade 1 knowledge may be unable to facilitate children's move to grade 2.

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She reports claims that in Scandinavia the policy of producing all materials in grade 1 Braille has increased the number of users and made production more economically viable.

Clunies-Ross concluded that the "place of uncontracted Braille is growing within the range of options on offer to blind readers" and suggests that "new groups such as older learners, very young learners, those in mainstream education, those who are adventitiously blind, children with learning difficulties and people for whom English is a second language … are finding it easier to learn" (p. 72).

Clunies-Ross refers to research evidence that suggests that there are no significant differences in achievement between those who begin to learn Braille with grade 1 and those who begin with grade 2. The same source (Hong and Erin 2004) suggests that, while Braille produced in grade 2 takes up less space, the assumption that it increases reading rates is not universally accepted and quotes Canadian research that finds no significant difference in reading rates between users of grade 1 and grade 2 Braille.

This question of the effect on literacy skills of the introduction to Braille with grade 1 has been taken up by a group of researchers in the United States and Canada (e.g. Barclay et al. 2007) who embarked on a five-year longitudinal study called the ABC (Alphabetic Braille and Contracted Braille), which is tracking the progress of children who were introduced to Braille through contracted code in comparison with children introduced through alphabetic (grade 1) Braille. Although the results are not yet published, public conference updates on the progress of the research suggest that no significant disadvantage in the introduction with grade 1 will be found.

4.6.4 The teaching of Braille reading

There is little evidence for a decline in the number of children learning through Braille in recent years (Keil and Clunies-Ross 2002). However, in the UK and the United States there is suspicion of a decrease in the standards of Braille teaching and a dilution of knowledge among the teachers of children (Spungin 1989; Wittenstein 1993).

Keil and Clunies-Ross (2002) suggest that in the UK this may in part be accounted for by the fact that a significant proportion of Braille readers up to the age of sixteen were found to

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have additional learning needs. They also suggested that increasing the educational placement of children who use Braille in local mainstream settings (83% of 5 to 10-year-old Braille users and 59% of 11 to 16-year-old Braille users were taught in mainstream) might in some cases reduce children's access to expert instruction from teachers experienced in Braille. For example, it was found that in some local authorities, teaching assistants play a "key role" (p. 10) in teaching Braille to children. However, as teaching assistants were often directly employed by local schools, they were outside the control of the specialist visual impairment visiting teacher service, and concerns were raised about their status, pay and training opportunities in relation to their role in supporting the development of Braille literacy.

Nevertheless, Keil and Clunies-Ross found that Braillists can be successfully taught in a range of educational contexts "provided that there is appropriate organisation of specialist staff, adequate training for staff and properly targeted funding" (p. 10).

In relation to the training of teachers to teach Braille, Keil and Clunies-Ross found that teachers of the visually impaired felt that there was a need for more focus in specialist teacher preparation programmes on specific training in teaching Braille literacy. Amato (2002) suggested standards for competence in Braille literacy that could be applied in specialist teacher training programmes and found that in the United States there was a wide variation in the content of courses and the amount of time allotted to Braille literacy in teacher training programmes. With regard to teacher training, Amato notes that not every trained teacher of the visually impaired has the opportunity to teach a student who uses Braille on completion of the programme. A teacher may for several years teach students who have low vision who use print without ever having opportunities for using their Braille skills and will require continuing in-service training and mentorship to be able to support a Braille user.

Douglas and McLinden (2005) noted that relatively little research exists that investigates the effectiveness of particular teaching strategies for pupils with a visual impairment generally. In the area of Braille teaching (which is possibly the most extensively researched area of visual impairment education), Rex et al. (1994) arrived at an "unsettling" conclusion that, despite an extensive body of literature, relatively little is known about the teaching of reading and writing in Braille.

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> Therefore some of the common instructional practices in teaching literacy to children who are blind may not be the best possible practices. The truth is, professionals in the field of blindness simply do not know (p. 131).

Nevertheless, a number of researchers have investigated the efficacy of teaching particular Braille reading skills (e.g. Caton et al. 1980; Mangold 1978; Wormsley 1981). The choice of letter introduction in Braille, the order of introduction of Braille contractions, the correction of errors that are peculiar to the Braille code—these are all elements of teaching strategies that should be considered carefully. A bibliography compiled by Tobin (undated) of more than seventy articles describing approaches to teaching Braille demonstrates practitioners' interest in these micro-strategies.

Teachers may need to resolve conflicting priorities in order to apply these micro-strategies to a child who uses Braille in a mainstream classroom, often having to accommodate their approach to local or national literacy approaches developed for children who use print. Rex et al. (1994) identify key differences in the instruction required for print reading and Braille reading. These include differences in the order of letter introduction, the use of contractions in Braille, the analytic rather than synthetic approach to reading (i.e. the cell-by-cell reading of the finger, compared with the eye's ability to chunk 2-10 letters). Parents, teachers or learning assistants who are not familiar with Braille may therefore find it difficult to "scaffold" a child's acquisition of literacy through Braille (Rogers 2007) without an understanding of these differences.

4.6.5 The role of technology

Mechanical Braille writing devices, such as the Perkins Brailler, are widely used in Braille education. In addition, an emerging and wide range of assistive technology to support reading and writing in Braille is available and is summarised in a range of textbooks (e.g. Wadell 1998; Kapperman and Sticken 2003); but such is the pace of development of technology that such sources quickly become outdated.

Reading technology includes software to allow the screen on standard computers to be read by Braille users. With output in speech or through electronic Braille displays (which is expensive), most on-screen information on computers is accessible to users who are blind.

The use of flatbed scanners with adaptive software also allows the Braille reader to access print books and documents through synthetic speech or Braille displays (or Braille embossers: see below).

With regard to writing technology, information can be recorded and stored in a standard laptop computer with adaptive software using QWERTY keyboard entry, with keyboard shortcuts. Specialised writing and storage devices with Braille entry and a refreshable Braille display or speech output (Braille note-takers) are preferred by some users. Most of the literature on specific writing devices is of the user-report variety. For example, Kapperman and Sticken (2003) reviewed the use of the "Braille Lite" note-taker in studying foreign languages. Cooper and Nichols (2007) reviewed the use of the "Mountbatten" Brailler (a semi-mechanical electronic writing device) with young users in the development of literacy skills. The Mountbatten was chosen over other, more sophisticated electronic writing devices, such as "Braille Note" and "Braille Lite", on the grounds that it produced a paper copy of the Braille directly. Teachers reported that children using the Mountbatten were able to do more independent writing, with less fatigue than on conventional mechanical writing machines, such as the Perkins Brailler.

With regard to production technology, electronic desktop Braille embossers have revolutionised the potential for small-scale Braille transcription and production. A growing realisation of the need for individual access to information in appropriate formats for children in schools has prompted moves towards the development of centralised banks of textbooks in electronic format. This move requires negotiations with publishers over copyright issues to enable children with visual impairment and their teachers to download digital versions of textbooks etc. from a database and to manipulate the text to the required format for the individual.

Pawson (2002) described how the RNIB in the UK was developing the use of the text formatting language XML to produce documents in formats (such as Braille, large print, etc.) that satisfy the varying needs of its blind and partially sighted clients. These types of elegant production system are likely to play a key role in Braille (and other accessible formats) in the coming years.

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4.6.6 Literacy through touch for visually impaired children with additional complex needs

There has been a long-standing recognition that substantial numbers of children who are blind are unable to read through Braille (e.g. Williams 1971; Lorimer 1978). Nolan and Kederis (1969) found that "retarded intellectual development" imposes a more severe limitation on learning to read through Braille than it does on learning to read through print. Lorimer (1977) observed that, even more than with sighted children, intelligence was an important factor in discriminating good and poor readers and determining levels of attainment. Millar (1997) concluded that "studies on reading generally exclude children with learning difficulties [intellectual disabilities] as well as known brain damage because Braille reading requires more cognitive skill than print" (p. 224).

Before 1990 virtually no research was undertaken to establish whether alternative formal symbolic codes might offer children with additional needs some access to literacy. As a result, most children with additional needs who could not make progress with Braille were excluded from participation in literacy activities. Research in the 1990s into the use of the Moon code (an alternative code to Braille, based on an adapted raised-line version of the print alphabet) suggested that Moon could be useful to some children as a route to emergent or functional literacy and that it offered some key advantages for the learner with additional needs unable to access Braille. Moon letters, for example, represent a bigger and more clearly defined tactile stimulus; unlike Braille, Moon characters can be enlarged without affecting their legibility; and sighted adults could learn the code quickly (McCall and Stone 1992; McCall and McLinden 2001). McCall and McLinden (2001) also found disadvantages with the code, including difficulties of production and a lack of resources and the potential for reversal and inversion of letters while reading. They also noted that most children who used Moon could not read it independently and that children were not reading Moon in the conventional sense but using it as an aid to simple choice-making, for the labelling of objects, or as a stepping-stone for moving from communication systems such as objects of reference to a more formal medium of literacy. Although isolated cases were found of children who made sufficient progress to subsequently transfer to Braille, most children who used Moon would never progress to fluent formal reading and writing.

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Research into teachers' perceptions of Moon (McCall and McLinden 2007) revealed that teachers claimed a range of benefits for children who had been introduced to Moon, including greater participation in lessons and improved interaction with adults.

McLinden and McCall (2002) presented an overview of the range of options for interpersonal communication through touch, including tactile sign systems, and concluded that opportunities for the development of functional literacy should be afforded to all children with visual impairment and that reading and writing fluently through Braille should be seen as the apex of a continuum of authentic literacy behaviour (Rex et al. 1994).

4.6.7 Summary

The evidence on reading performance among children who use Braille suggests that there is a gap between the performance of Braille readers and print readers in accuracy, speed, and comprehension. In particular, children who read through Braille generally read more slowly and less accurately than fully sighted print and low-vision print readers. The gap in performance increases with age, particularly in the area of reading speed.

There is evidence that delay in phonological awareness may have an effect on the development of Braille, but this is not certain. The evidence seems to suggest that there is little difference in spelling ability between print and Braille users. Some of the reasons for the gap in performance relate to the differences between Braille and print.

Decisions about the most appropriate medium for children with very low vision or deteriorating conditions can be difficult and emotionally charged. A range of guides has been developed to assist with decision-making, but introducing Braille to children who can also access print needs careful consideration of the individual's circumstances. Only a small proportion of children require access to both Braille and print: most will focus on one medium. Children who use both Braille and print often select the medium to match the demands of the reading task.

The successful introduction of Braille is contingent on a positive attitude by parents and appropriate support from class teachers and other professionals who support the child in the classroom (for example learning assistants in the UK, special-needs assistants in Ireland).

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4. Review Focus: Classroom and the Curriculum

There is a debate about whether and when to introduce contractions in the teaching of Braille. Traditional beliefs about the importance of introducing reading through contracted Braille from the beginning are being re-examined. (In part this is linked to many Braille readers being in mainstream schools in which their sighted peers learn print.)

There appears to have been no significant change in recent years in the numbers of children using Braille (Keil and Clunies-Ross 2002), but there is a common perception in the UK and the United States that the standard of Braille teaching has declined. The range of possible explanations for this perceived decline include additional learning difficulties among Braille readers, reduced access to specialist Braille teaching, and increased dependence on learning assistants in those countries as a result of the increasing placement of children in local schools.

There is support for the view that the educational placement of the child is not, of itself, a critical factor. However, for children who use Braille to be successful there needs to be an appropriate organisation of specialist staff, adequate training for staff members (including class teachers and learning assistants), and properly targeted funding. Training for specialist teachers may need to include opportunities for in-service "top up" training, as some teachers may not have had the opportunity to work with children who use Braille.

Although a number of well-researched Braille-specific micro-strategies have been developed to support the development of skills in Braille reading, there has been little research into the efficacy of these approaches. Nevertheless, many of these approaches involve one-to-one tuition with a teacher who has a thorough knowledge of the Braille code and strategies for teaching it. Intrinsic elements of the Braille code require special consideration in teaching, and the methods used to support the development of literacy in children who use print may need significant adaptation for children who use Braille. Classroom teachers, learning assistants and parents need training opportunities to understand these differences in order to assist with the child's development of literacy through touch, and children need regular access to a teacher trained in the development of literacy through Braille.

A wide range of adaptive technology is available to support the teaching and learning of children who use Braille. Key choices for writing include whether to use standard computers

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or laptops with standard QWERTY input and adaptive software or to use specialised Braille notebook computers with Braille input and speech or Braille output.

For planners an important consideration relates to the production and distribution of materials in Braille. The co-ordinated central or regional production of Braille materials probably remains essential. However, developments in technology make it possible for material to be supplied through a central "bank", which would store and distribute electronic files of such materials as textbooks. These files could allow materials to be produced locally at school or at home at the preferred time and in the preferred format.

The complexity of the Braille code and the sophisticated motor and touch skills that Braille reading requires put literacy through Braille beyond the reach of many children who are blind and who have additional needs (including children with MDVI). These children make up the majority of children who are blind (see section 3.2, Identification of visually impaired children). Until recently these children would have been routinely excluded from the processes of literacy, on the basis that they could never learn Braille. There has been some research into the possibilities afforded by alternative tactile codes, such as Moon, for children who are blind and who have additional disabilities that suggests that children with MDVI have the potential for engagement in functional literacy activities and need access to opportunities to engage in literacy-related activities that have clear functional applications.

Key points

- As with print reading, Braille reading can be usefully thought of as including three key components: speed, accuracy, and comprehension.

- Children who read Braille tend to read more slowly than normally sighted children. They also tend to read less accurately, with poorer comprehension. Some reading errors made by Braille readers are particular to the nature of the Braille code.

- Decisions about the most appropriate medium of literacy for children with low vision or a deteriorating condition require careful consideration. A range of guides has been developed to assist with this decision-making process. In some cases children may need to learn through both print and Braille simultaneously.

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- There is a ongoing debate about when to introduce Braille contractions to children. There appear to be no major disadvantages in introducing children to uncontracted Braille (i.e. grade 1 Braille).

- Concerns about a drop in the standard of Braille teaching and the uptake of Braille seem unsubstantiated. However, children who can learn through Braille are at present more likely to be educated in mainstream schools than was the case in previous years. Therefore there is a requirement to reconsider some of the approaches to teaching Braille (including the involvement and training of teaching assistants).

- The literature contains a wealth of descriptions of approaches to teaching Braille, though little is known about the relative efficacy of these approaches.

- There is general agreement in the literature that children learning Braille require a considerable amount of one-to-one teaching input.

- A wide range of adaptive technology is available to support the teaching and learning of children who use Braille.

- The co-ordinated central or regional production of Braille materials probably remains essential. However, developments in technology make it increasingly possible to store electronic files of materials, such as textbooks, centrally. These files could then be distributed through the internet and produced locally at school or at home, at the preferred time and in the child's preferred format.

- Braille may not be appropriate for some children with very low vision, including those with multiple disabilities and visual impairment (MDVI). There has been some encouraging research into the possibilities afforded by alternative tactile codes, such as Moon. Through the use of these codes it has been shown that children with MDVI have the potential to engage in functional literacy activities.

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4.6.8 Recommendations: Braille literacy

Braille offers a well-established and well-researched route to literacy for some blind children. Deciding about the most appropriate medium of literacy for children with low vision or a deteriorating condition requires careful consideration. It is recommended, therefore, that specialist services with responsibility for supporting children with visual impairment ensure that appropriate expertise is available for undertaking an assessment of a child's literacy needs, with appropriate reference to the range of guides that have been developed to assist with this decision-making process. This assessment will need to acknowledge that

- while Braille may be an appropriate route to literacy for most blind children, in some cases children may need to learn through print *and* Braille simultaneously;
- Braille may not be appropriate for some children with very low vision, including those with multiple disabilities and visual impairment (MDVI). Alternative tactile codes, such as Moon, should be considered as possible routes to literacy for some children;
- given the particular demands of learning Braille, appropriate expertise, resources and adaptive technology will need to be available to support children in mainstream settings;
- the co-ordinated central or regional production of Braille materials probably remains essential. However, developments in technology make it increasingly possible to store electronic files (for example textbooks) centrally. These files can then be distributed through the internet and produced locally in the school or at home, at the preferred time and in the child's preferred format.

5. Review Focus: Additional Curriculum Needs

5.1 Introduction

The focus of this section is the "additional curriculum". The section is structured under four headings to reflect key strands of the literature within this theme. Each sub-section concludes with key points and recommendations.

- Mobility and independence (5.2)
- Social and emotional inclusion (5.3)
- ICT (5.4)
- Low-vision training (5.5)

5.2 Mobility and independence

5.2.1 Introduction

Mobility and independence education for children who are visually impaired is essential to enable them to participate safely and confidently in activities within and beyond school (Welsh and Blasch 1980; Emery 1984; Anderson 1995, 1996, 1997a, 1997b; Yakura 1994). Many aspects of mobility and independent living skills are learnt incidentally by children with sight, through the observation of others doing them; therefore children with visual impairment require specific instruction from trained specialists to replace the role of vision in the development of these skills and to enable them to travel safely and independently (Lewis and Iselin 2002; Hatlen and Curry 1987). This need for training is also true for those who lose their sight in childhood, as they must learn to travel safely in a different way.

Without intervention it is argued that visually impaired children would otherwise face many difficulties in acquiring orientation and mobility skills, particularly in forming body concepts, mental maps of their surroundings and the wider world, and concepts of distance. This has been demonstrated in developmental delays observed in young children and babies who are blind or have severe visual impairment (see Dale and Salt 2007), for example delays in reaching (Sonksen 1983), a greater likelihood of being physically passive (Fraiberg 1977), and delayed posture control, co-ordination, and self-initiated mobility (Sonksen et al. 1984).

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5. Review Focus: Additional Curriculum

This is also true for older children with visual impairment. In a comparative study, Lewis and Iselin (2002) found that visually impaired children did not achieve the same range or level of competence in the mastery of independent living skills as their sighted peers. Similarly, Crisp (1976) found that the degree of concept a child has of body-awareness, space orientation and kinaesthetics correlates with the amount of sight they have.

In spite of a general acceptance of its importance, a number of studies suggest that there has been a lack of agreement among professionals about the content and focus of mobility and independence (M&I) education programmes (e.g. Pavey et al. 2002a, 2002b; Wall Emerson and Corn 2006), with some focusing solely with orientation and mobility (O&M) (e.g. British Columbia Ministry of Education 1999; Wall Emerson and Corn 2006), while others used a broader definition of M&I, encompassing skills relating to O&M, independent living skills (ILS), and communication and social skills (e.g. Pavey et al. 2002a, 2002b). Pavey et al. (2002a, 2002b) argue that this lack of clarity and shared understanding of what curriculum should be taught has been a problem in the UK.

The literature relating to delivery of mobility and independence education falls into the following areas:

- Pre-school provision and early intervention
- Intervention in mainstream school settings
- Children with multiple MDVI
- Training for professionals involved in the delivery of M&I education

As with other topics, there is relatively little literature that has evaluated mobility educational interventions. Many of the established texts on mobility and independence deal with aspects of adult provision, and much of the literature found relating to the delivery of services to children is based on anecdotal accounts by practitioners in the field of visual impairment education rather than being based on research. More recently, however, some noteworthy surveys have been undertaken, particularly in the UK. The great majority of the literature focuses on the American and British contexts.

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5.2.2 Pre-school provision and early intervention

Many authors have argued the importance of early intervention in orientation and mobility support for children with visual impairment, and many believe that support should begin before formal education (e.g. Leong 1996). For this reason the assessment and intervention approaches developed for pre-school visually impaired children include aspects of movement, mobility, and dexterity (e.g. Reynell-Zinkin Scales, Reynell 1979; Oregon Project for Visually Impaired and Blind Pre-school Children, Brown at al. 1986; Developmental Journal, Dale and Salt 2007).

Not surprisingly, many studies describe the involvement of parents. Pavey et al. (2002a and 2002b) found that much of the work that professionals carry out with pre-school children is with the parents and family and others who work with the child, such as nursery staff, through increasing their awareness of mobility and independence and their expectations for their child, both of which may be low. (This was also noted by Stuart et al. 2006 and Preisler 1993.) Evans (2007) and Stewart et al. (2006) suggest a number of practical ways in which parents and others supporting very young blind or partially sighted children can encourage early movement. Shon (1999) reviewed the barriers faced by pre-school children with visual impairment in gaining access to the environment and described the approaches that can be taken to reduce these barriers, including the teaching of access skills and the modification of environments through a team effort by parents, professionals, and the general public. Similarly, Joffee (1988) described the development and implementation of a home-based orientation and mobility programme for blind and visually impaired infants and toddlers. Due to problems encountered in scheduling sessions and the limited availability of suitably trained professionals, the author proposed an alternative service delivery model that would make use of the O&M specialist as a resource to parents and early intervention programmes.

Examples of studies that look in detail at pedagogical aspects of working directly with pre-school children include a paper by Progrund and Rosen (1989), who examined the teaching of early use of the cane and challenged traditional arguments against its early introduction. They also considered instructional and optional strategies for teaching the use of the cane to pre-school children. Skellenger and Hill (1991) also looked at the practices and considerations regarding the introduction of the long cane with pre-school children, reporting the findings of

a survey of thirty-seven O&M specialists working with pre-school children. Similarly, a study by Dykes (1992) reported on a survey of fifty-two mobility instructors in California to determine how many were teaching long-cane techniques to pre-school children, the type of techniques being taught, and the perceived advantages and disadvantages of an early introduction to the cane. The findings demonstrated that mobility instructors were overwhelmingly in favour of the early introduction of the long cane.

Clark et al. (1994) compared the effectiveness of a long cane and a pre-cane device as an initial protective device for pre-school children. They found that the pre-cane device was the easier of the two devices for young children to use appropriately, and that it protected the children from body contact with travel obstacles to a greater extent than did the longer cane.

5.2.3 Intervention in mainstream school settings

Anxieties about how mobility and independence education could be delivered in mainstream classes have been voiced for some years. As early as 1985 Fagan, Mabert and Cowen (1985) were concerned about how additional skills required by children with visual impairment would be delivered to children in mainstream schools, as they were not a feature of the mainstream curriculum. Indeed, in contrast to the regular and comprehensive programmes of M&I education often provided in special schools for the visually impaired (Ellis 1991; Kear and Smith 1997), the patchy and inconsistent nature of provision to children in mainstream education in the UK has been documented both by practitioners in the field (e.g. Ellis 1991) and by research studies (Pavey et al. 2002a, 2002b; Dawkins 1991; Lee 1988).

In the UK the "Steps to Independence" project (Pavey et al. 2002a, 2002b) set out to formulate a series of comprehensive recommendations for the delivery of the M&I curriculum to ensure that children in mainstream settings receive appropriate support. In developing the recommendations the authors observed many examples of good and successful practice and offered recommendations on that basis. A broad recommendation involved the use of appropriately trained staff members through advisory teaching services. However, they also noted examples of good practice by M&I teachers working through outreach schemes from special schools. A challenge for such a model is that some aspects of the M&I curriculum require an intensive specialist input (similar to the teaching of Braille), and this can be difficult,

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whether through short interventions made by specialist staff or through a consultancy model. While the recommendations were drawn from good practice, they have not been systematically implemented or evaluated in the UK.

5.2.4 Children with MDVI

The mobility and independence needs of children with multiple disabilities and a visual impairment have been less well documented; much of the literature available was published in the 1970s to 1990s about the USA context, and deals with orientation and mobility in particular, rather than the more broadly defined term "mobility and independence".

Early studies sought to investigate the degree of independence that visually impaired children with additional disabilities, in particular learning difficulties, could achieve with the intervention of specialists in mobility and independence. An early study by Johnson and Corbett (1973) described the work carried out with blind children in a US centre for children with learning difficulties, which indicated that they could be taught orientation and mobility skills through an emphasis on very basic pre-cane skills and the addition of more intermediate steps in the standard teaching techniques. Merbler and Wood (1984) examined the relationship between the chronological age, the social age, the motor, sensory and concept skills and the orientation and mobility skills of thirty-seven visually impaired children with learning difficulties and found a strong relationship between their developmental level in the areas of motor, sensory and concept skills and proficiency in mobility.

With regard to M&I skills, many aspects of the early and foundation M&I curriculum recommended in the Steps to Independence project (Pavey et al. 2002a, 2002b) are relevant to children with MDVI, though the teaching methods and activities need to be modified so that these are relevant and meaningful to children with MDVI. (See also Kelley and Davidson 1993.)

A number of researchers have looked at the development of programmed instruction in visual orientation and mobility for multiply impaired children with low vision from pre-school age to early adulthood (Harley et al. 1978; Harley and Merbler 1980); their field tests with forty-four and forty-two children, respectively, demonstrated the success of the techniques used in the programmes. Later research by Harley et al. (1987) demonstrated the success of

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similar but adapted interventions with twenty-two multiply impaired children who were blind. Meanwhile Bailey and Daniel (1993) looked at the context of working with MDVI children and described how children with severe multiple disabilities learn best when they are viewed as a whole person whose learning needs are interrelated with their typical daily life; this emphasises the value of interventions that occur within natural settings, routines, and activities.

Other studies that have looked at the pedagogy of working with children with MDVI in mobility and independence include a study by Morse (1980) that described the modification of the long cane and variations in technique for children whose body image, concepts or physical abilities preclude the use of standard mobility methods. Chen and Smith (1992) described the programme components, training staff, adaptations to school environment and individualised and community training techniques that were used successfully with twenty children with developmental disabilities.

A number of researchers have developed screening tools to enable practitioners to assess children with MDVI so that appropriate M&I programmes can be designed. For example, Hill et al. (1992) describe an orientation and mobility screening device for visually impaired pre-school children with additional physical, cognitive or behavioural impairments. One of the forms of screening was developed for children who were less than 2 years old and had delayed development or were non-ambulatory. The forms were nationally field-tested and evaluated by twenty practising O&M instructors in the United States, who agreed that they were appropriate for determining areas for further assessment as well as needs and eligibility for O&M services.

5.2.5 Training of professionals

The literature reflects a general concern about the availability and training of staff to teach mobility and independence. UK research by Franks (2000) and Pavey et al. (2002a, 2002b) found that many qualified rehabilitation officers (key staff members in the UK context) felt ill-equipped to work with children, particularly young children or those with complex needs, many having been trained to work with adults only. Research in North America has also found a shortage of suitably trained professionals to work with children (Stewart and Zimmerman

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1990; Skellenger and Hill 1991). More recent work by Gray (2008) involving interviews with the majority of rehabilitation workers in Northern Ireland produced similar findings.

A variety of "second-level" or "add-on" training programmes now exist in the UK that are specific to working with children, mainly focused on aspects of "mobility and travel" rather than independent living skills (ILS), leading to a range of qualifications. These programmes all claim to be suitable for qualified teachers and teaching assistants as well as for qualified rehabilitation officers. Pavey et al. (2002a, 2002b) recommended that interested parties should agree on common standards for training. Until recently, St Joseph's School in Dublin ran a similar programme; the orientation and mobility training course ran from 2000 to 2008 and finished because the validation agreement with the University of Worcester ended.

The Guide Dogs for the Blind Association carried out a four-part survey into the "functionality" and the needs of blind and partially sighted young people in the UK, involving young people, parents, educators, and mobility specialists (Nzegwu and Dooley 2008). The self-completed survey was completed by forty rehabilitation and mobility workers, all of whom were then working with at least one child as part of their case load. They felt that the reasons for the scarcity of specialist workers for children were the lack of a nationally recognised curriculum for mobility, the inadequate funding of services, and the fact that mobility training is not sufficiently valued by schools and other professionals.

Partly in response to the existing incoherence of existing training provision in the UK, Miller (2007) describes a project ("Mobility 21") that began in 2007 to examine the need for specialist standards and recognised qualifications for M&I specialists who work with children. One of the main objectives is to develop a national qualification and training scheme in line with these standards. The proposed scheme would follow the Scandinavian model of "social pedagogue", a term that describes a professional who works in both home and school to facilitate social inclusion and independence in the school and the wider community. The project team aims to have designed and launched the scheme by September 2010.

Related to this project, National Occupational Standards have recently been published (in November 2008) by the Children's Workforce Development Council (CWDC), which represents the main employers of those who work with children in the public, private, voluntary and independent sectors in the UK. The Sensory Services National Occupational

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Standards are statements of the skills, knowledge and understanding needed in employment and clearly define the outcomes of "competent performance". There are eleven standards for professionals to adhere to, most of which are relevant to professionals working with visually impaired children (see CWDC 2008).

5.2.6 Summary

Children with visual impairment, particularly severe visual impairment, are often developmentally delayed in relation to motor development. Without appropriate intervention, children and young people with visual impairment will find it difficult to learn to be mobile and independent. There is clear evidence that visually impaired children (including young children and children with MDVI) can be taught these skills, and much professional literature is written about methods of teaching. A few studies have also been carried out that compare the efficacy of different specific approaches (for example comparisons of different cane techniques). However, it is generally accepted that one-to-one work with an expert mobility teacher, in combination with consistent practice and reinforcement from other carers (especially parents in early years), is crucial.

A key focus of the literature (much of it related to the UK and the United States) is on the definition of a mobility and independence "curriculum" and the challenges of teaching such a curriculum in mainstream settings (given the general view of the approaches needed, described above). In recent years literature in the UK has presented recommendations based on "good practice" observations and "expert views", but this has not been systematically evaluated.

Additionally, the literature describes the difficulties of training and funding the staff members to carry out this work.

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Key points

- Children with visual impairment (particularly severe visual impairment) are often developmentally delayed in relation to motor development.

- Given appropriate support and teaching, visually impaired children (including young children and children with MDVI) can be taught to be mobile and independent.

- It is generally accepted that teaching requires one-to-one work with an expert mobility teacher in combination with consistent practice and reinforcement from other carers, and especially parents in the early years.

- The delivery of this teaching has been identified as a problem in many countries in recent years (partly linked to children being educated in mainstream schools in which mobility teachers are often not readily available).

- Recommendations about how such teaching should take place have been developed, based on "good practice" observations and "expert views", but these have not been systematically evaluated.

5.2.7 Recommendations: Mobility and independence

Children with visual impairment (particularly severe visual impairment) are often developmentally delayed in relation to motor development. However, there is clear evidence that they can be taught mobility and independence skills, given appropriate support. It is recommended that

- visually impaired children should be assessed to establish their needs in relation to mobility and independence;
- services should provide appropriate teaching to visually impaired children in the area of mobility and independence;
- this teaching is likely to require one-to-one work with a mobility teacher, in combination with consistent practice and reinforcement from other carers (especially parents in the early years).

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5.3 Social and emotional inclusion

5.3.1 Introduction

The literature in this area is largely made up of empirical studies, including research reports and surveys and literature reviews.

Three earlier literature reviews provide a useful context for this theme and illustrate a reliance on literature that is predominantly made up of "expert views", small-scale studies, or observations (Kemp 1981; Ammerman et al. 1986; O'Donnell and Livingston 1991).

Kemp (1981) carried out a literature review concerned with the social and psychological aspects of blindness, particularly blindness in children, personal and social adjustment to blindness, and blind adults' attitudes towards blindness and communication. The review suggested that many of the "problems" in communication between blind and sighted people may be caused by differences in social cues, with blind people shown to be more likely to interrupt and to use fewer gestures than their sighted peers.

A later review by Ammerman et al. (1986) dealt with the psychological adjustment of children with visual impairment. It was suggested that a number of mediating variables influence development in visually impaired children, including "etiology of vision loss", "extent of impairment", and "residential setting". Though the author acknowledged that the paucity of controlled research makes it difficult to draw firm conclusions from the data, it was suggested that, although visual impairment places children and adolescents at high risk of "psychological dysfunction", it does not by itself necessarily cause "maladjustment".

A later review of literature that dealt with the exploration of the environment by young children with low vision (O'Donnell and Livingston 1991) showed the importance of providing opportunities for the children to "actively" explore suitably motivating environments. The review suggested that young children experience delays in the development of "social skills" as a result of a lack of motivation as well as insufficient opportunities to explore their environments actively.

The topic can be divided under the following broad headings:

- Promoting social interaction among pre-school children

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- Social inclusion among school-age children.

5.3.2 Promoting social interaction among pre-school children

This overview considers a selection of the literature that has as its theme the development of social skills and social attachment in young children (i.e. before formal education begins). The literature has established that without intervention visually impaired children could face many difficulties in relation to their social development. For this reason the approaches to assessment and intervention developed for pre-school visually impaired children include aspects of social and emotional development (e.g. Reynell-Zinkin Scales, Reynell 1979; Developmental Journal, Dale and Salt 2007). With regard to intervention, most of the literature is based on "expert views" linked to observed differences between visually impaired children and their sighted peers. The literature search did not reveal clear evidence that intervention brought about improvement in social development, although the expert views are very persuasive.

Warren (1994) reports that, given the potential implications of visual impairment for social development, "the importance of studying issues of social interaction, particularly in the preschool and early school years, can hardly be overstated … Much of the child's adaptation to the intellectual demands of school will rest on a foundation of adequate social participation in the school setting" (p. 272). However, he comments that, taking into account the importance of these skills as a "prerequisite" to the child's effective social interaction, particularly with peers, "it is surprising that significant areas have not been devoted to the specific training of social interactive skills" (p. 331). This view is supported by Augusto (1992), who emphasises that although educational efforts have concentrated on the academic needs of children who are blind or visually impaired, the social needs of these children have not usually received equal attention. Augusto concludes that "the teaching of social skills needs to become recognised as an integral part of the curriculum for visually impaired students" (p. viii).

Webster and Roe (1998) note that a child's developmental profile is uniquely determined by a complex interplay of factors that may be influenced by a visual impairment. In considering the early development of children who are visually impaired, they emphasise individual

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experiences that result in different routes and styles of development; they also stress the importance of the social environment as well as the quality of interpersonal encounters with others and propose that "some of the developmental difficulties observed in children are in fact caused by the strategies adopted by adults or by limiting conditions found in certain environments" (p. 4). By implication, the authors argue that these environmental conditions should be modified. The strategies they identify for modifying the learning environment in mainstream settings include the use of "low-vision aids, appropriate décor and physical layouts, lighting conditions and equipment and relevant technology" (p. 6). They argue that adults can modify the teaching and physical environments by concentrating carefully on how visually impaired children are introduced to tasks and by mediating their experiences through language and social interaction and interventions that help to shift the children's thinking. They go on to suggest that while it is "unrealistic to think of entirely restructuring" environments in mainstream schools (p. 165), simple measures can be taken to ensure a "predictable" physical environment, such as tidying corridors and walkways and providing acoustic and tactile cues, such as non-slip mats to mark entrances to rooms. Improving the visual environment through attention to lighting and contrast and careful classroom organisation can also promote learning.

As is a common "access" strategy in the field of visual impairment, Perez-Pereira and Conti-Ramsden (1999) note that children who are blind and their parents develop *alternative* forms of social interaction and early communication that are able to provide different routes for the "development of a child as a social, communicative being" (p. 37). The authors conclude that while vision may not be an essential requirement for successful social interaction in infancy it does contribute to the "spontaneity", "ease" and "frequency" with which these early social exchanges take place. They describe an essential implication of this conclusion, namely that "adults engaging with blind infants have to be more aware of the need for establishing routines and cycles of interaction and also they need to be more patient and careful in detecting responses and signs of engagement on the part of the blind infant" (p. 45).

Furthermore, the important role of the child's adult partner is emphasised, particularly in developing "alternative" modes of developing routines and cycles of interaction that do not rely on visual information. Examples cited are the use of touching, tickling and vocalisations as well as appropriate language for engaging in interactions that afford joint attention and

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communication. As the authors note, an important aspect of effective support is learning to recognise the child's responses to particular types of interaction, particularly as a blind child's responses could be less predictable and could lead to confusing interactive episodes.

Warren (1994) notes that while there is no question that the visually impaired infant is "at risk" for inadequate attachment, "the risks are not necessary consequences of the infant's visual impairment. They can be avoided in a social-interactive environment in which the infant's interactive behaviours are encouraged and responded to" (p. 216).

A selection of empirical studies from the literature serves also to emphasise the importance of the environment in promoting opportunities for early social interaction. As an example, Parsons (1988) considered the teaching of play and language skills and outlined differences in the play behaviour of young children with low vision. It is reported that while play skills evolve as a natural part of development, a similar assumption cannot be made about children with low vision, who may need to be "taught" functional play skills, requiring an "active teaching" effort on the part of parents and teachers. An outline of suggestions and tips for providing "constructive" play experiences to young children in the home or in a centre is presented. In related work, Parsons (1986a, 1986b) describes a comparative study, exploring the patterns of play behaviour in young children with low vision in a structured free-play situation when compared with sighted children. The results provided evidence that the patterns of play in young children with low vision differed significantly from those of their normally sighted peers. They found significant effects of visual impairment and age on the play patterns identified, indicating both quantitative and qualitative differences between groups. In a similar study Crocker and Orr (1996) studied children in a range of pre-school settings, and it was found that visually impaired children interacted with their classmates less frequently than fully sighted children, and were less likely to initiate social interactions with other children than their sighted peers. The authors reported that visually impaired children were much more prone to initiate interactions with their teachers than with their classmates. They noted that contacts with other children "were fleeting and typically did not appear to develop into stable relationships." They stressed that verbal modelling was necessary to provide information about the environment, and recommended that there should be "expectations for play and acceptable responses," noting that sensory disabilities appear to affect not only the quantity but also the quality of social exchanges. They concluded that the success of pre-school

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integration requires specialised interventions to encourage interaction with fully sighted children.

In a later study Skellenger et al. (1997) investigated the behaviour of twenty-four pre-school children with visual impairments and no other disabilities in indoor play settings. The study found that the children interacted and played at "lower levels" than expected for 2 to 5-year-olds and that their learning medium (visual or tactile) seemed to affect both the amount of interaction and the amount and type of play in which they engaged. More recently, D'Allura (2002) examined the effects of "reverse mainstreaming" in a pre-school with a particular emphasis on the social interaction patterns of children with and without visual impairments. The study compared the social interactions of children in two classes, one of which included a mixture of sighted and visually impaired children and the other only visually impaired children. Training was given to teachers and teaching assistants in the mixed class in strategies to promote co-operative learning, but no training was provided to the other class. Before the intervention the visually impaired children in both classes spent only 5% of their free time interacting with their classmates; this contrasted with the sighted children, who spent more than 20% of their time in interactions. Following the intervention the visually impaired children in the mixed group equalled the interaction rate of their sighted peers, while the interaction rate in the other class remained unchanged. They concluded that visually impaired children could interact with their peers at the same rate as sighted children if provided with the right environment. They also found that in the right environment visual impairment of itself does not affect the likelihood of being chosen for interaction by other children.

Zanandrea (1998) described an activities programme aimed at developing important motor, play and social interaction skills, along with co-operative teamwork skills, in pre-school children with visual impairments.

5.3.3 Social inclusion among school-age children

The literature under this heading draws on a range of empirical studies into the identification of particular challenges faced by visually impaired pupils and into interventions.

Huurre and Aro (1998) carried out a survey of visually impaired adolescents and concluded that they had fewer friends and fewer dates with other young people, and reported feelings of loneliness and difficulties in making friends more often than their sighted peers. Girls were particularly vulnerable to low self-esteem. Sacks et al. (1998) reported two studies investigating the life-style of visually impaired young people (aged 15 to 21). Both studies showed that "socialisation" was an important area in which they needed support.

The importance of including the "voice" of the child is increasingly recognised in recent literature relating to the social and emotional development of children with visual impairment, which is illustrated through reference to three research studies that drew directly on interviews with children. A large-scale survey was carried out during the late 1990s in the UK by the RNIB, and the findings were published in a series of research reports (e.g. RNIB 2001).

More than a thousand blind and partially sighted children and young people aged between 5 and 25, or their parents, were asked about their experiences, needs, and aspirations. They were also asked to identify changes that could be made to improve the lives of blind and partially sighted children and young people generally. The parents of children of primary and secondary school age were asked to provide one factor that they considered to be of most importance. Both groups of parents awarded the highest ranking to "teachers who listen" (40%), followed by "sufficient help in the classroom" (30%), and "no bullying" (13%). The report commented:

> It is notable that all these priorities relate to social and interpersonal aspects of school life—a teacher who really listens, and classmates who do not bully or tease—reflecting the important role played by these factors. The prioritising of sufficient help in the classroom over material resources such as computers and books—important though these undoubtedly are—serves to highlight the fact that the provision of specialised equipment without the back up of properly trained, sympathetic staff is insufficient. (RNIB 2001, p. 159)

The work of McBroom (1997) provides a further example of a relatively large-scale study that draws directly on the experiences of visually impaired young people. The author interviewed 102 college students (18-year-olds and older) who were registered blind and as part of the

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interview asked them what advice they would give to incoming students with a visual impairment (i.e. those leaving school). Of significance was that, of the eleven pieces of advice, five related directly to "social activity", including regular contact with peers, assertiveness and independence skills, and active involvement in extracurricular activities.

Finally, a study by Bearfield et al. (2005) was based on a regional social inclusion project in the UK, which involved surveys of professionals and interviews with visually impaired children. While it is acknowledged that there is no general rule for all children and young people with visual impairment, an important message to emerge from the interviews was that particularly vulnerable times in social and emotional well-being are "times of worsening vision, transition between schools, and in later teenage years when visual impairment might limit some activities they are able to do with their friends" (p. 13). While the survey showed that professionals were committed to supporting children in overcoming these problems, this was not reflected at the policy level of the services they worked for.

Preisler (1997) offers a rare example of a detailed longitudinal study of the early development of eight children diagnosed as blind, from infancy to pre-adolescence. The findings of the study reveal some interesting aspects of the early social interactions of young children who are blind in the school environment. As an example, the sighted children were often observed moving around the classroom, talking and chatting, while the children who were blind were not observed spontaneously taking part in the sighted children's symbolic play or role-playing and, with a few exceptions, were observed engaging in symbolic play only with adults. Furthermore, as the children developed there was a growing awareness of being blind or at least of being "different". Preisler argues that when discussing the blind child's socio-emotional development it is necessary to look on the child as part of "a system of relationships," within the family, within the extended family, and within society. A similar finding was reported by Weiner (1991) in relation to older children and adolescents in a study of the social networks of fifty-five youths aged 14 to 23 who were blind or had low vision. The study showed that while the number of friends increased with age, the family remained the predominant social support network. Preisler suggests that, rather than the focus of intervention being solely on "performance and skills", the emphasis will need to shift from the individual performance of the blind child to the forming of relations between the child and the social environment. This view is supported by Lewis and Collis (1997), who, in

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discussing Preisler's findings, state that the blind children seemed to do the "right things" to provoke social interaction, at least in the early stages, but, crucially, the responses of others in the school were not sufficiently adapted to meet the children's needs.

Intervention approaches that have been demonstrated in the literature to be of value are self-evaluation techniques (Jindal-Snape 2004), assertiveness training (Kim 2003), and whole-class workshops (Peavey and Leff 2002; Terrell 1981). The last two studies are interesting because the intervention approach emphasises the attitudes and skills of the visually impaired person's sighted peers (the point made by Lewis and Collis, above). For example, Terrell (1981) reports on a study conducted to consider the effects of a short-term teaching unit in correcting "misinformation" and increasing positive attitudes towards visually impaired people in a mainstream school. Sighted children from the fifth grade (9 to 12 years old) were exposed to a three-session teaching unit related to visual impairment. An attitude questionnaire was administered in a pre-test and post-test format. It was suggested that the increase in positive responses following the teaching unit could be useful in helping sighted children to develop "realistic and positive" attitudes towards visually impaired persons.

5.3.4 Summary

A young child's developmental profile is determined by a complex interplay of factors that may be influenced by a visual impairment. There is a broad consensus that while vision may not be an essential requirement for successful social interaction in infancy it does contribute to the "spontaneity", "ease" and "frequency" with which these early social exchanges take place. There is therefore a general acceptance that young children with visual impairment need specific active teaching from adults to develop social skills, including functional play skills. Differences in play behaviour and social cues that directly relate to visual impairment may constitute barriers to social development. Given the lack of opportunities for social interaction with fully sighted children in the early years, systematic instruction is necessary to promote social skills (and many are suggested in the literature). However, the review has not identified studies that demonstrate the effect of these interventions.

As with the pre-school age group, there is a broad consensus in the literature that visual impairment can be associated with difficulties, including the formation of friendships and

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isolation at school (including mainstream school) and that "physical inclusion" in a mainstream school does not guarantee "social inclusion". Particularly vulnerable points in a child's school career may be times of worsening vision, transition between schools, and later teenage years when visual impairment might limit some activities they are able to engage in with their friends. The literature suggests that visually impaired people themselves understand the difficulties they face and rate them as very important. There are only a few studies that present empirical findings of interventions. One approach deals with supporting the personal development of the visually impaired person (for example assertiveness training and communication skills). Another approach is through the training of sighted peers (for example to improve sighted children's attitudes towards visually impaired children and their communication skills).

Key points

- Differences in play behaviour and social cues that directly relate to visual impairment may constitute barriers to social development among visually impaired babies and young children. This view is supported by a substantial section of the literature.
- Early intervention programmes have been developed that include techniques for encouraging social interaction with visually impaired young children. These programmes tend to concentrate on parent-child interaction.
- While there is general acceptance of the importance and the benefit of interventions to encourage social development in visually impaired young children, the literature review has not identified a study that categorically demonstrates the efficacy of these interventions.
- There is a broad consensus in the literature that visual impairment can be associated with isolation at school (including mainstream school) as well as challenges in the formation of friendships. Particularly vulnerable times for children include times of worsening vision, transition between schools, and later teenage years when visual impairment might limit some activities they are able to engage with with their friends.
- Interventions include supporting the personal development of the visually impaired child (for example assertiveness training and communication skills) as well as the

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training of sighted peers (for example to improve sighted children's attitudes towards visually impaired children and their communication skills).

5.3.5 Recommendations: Social and emotional inclusion

There is general acceptance of the importance and benefit of early identification and interventions to encourage social development in young children with visual impairment. While the literature review did not identify a study to demonstrate the efficacy of these interventions categorically, it is recommended that

- services should identify children as soon as possible after diagnosis of their visual impairment and offer support and advice to carers in relation to encouraging communication and early development.

Among older children and young people there is also a broad consensus in the literature that visual impairment can be associated with isolation at school as well as challenges in forming friendships (including mainstream school). It is recommended that

- services can usefully provide interventions that support the personal development of the visually impaired child (for example assertiveness training and communication skills), as well as the training of sighted peers (for example to improve sighted children's attitudes towards visually impaired children).

While visually impaired children can benefit from such support at various points in their school career, it might be targeted at times when children are particularly vulnerable (including when vision is deteriorating, at transition between schools, and in later teenage years).

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5.4 ICT

5.4.1 Introduction

Douglas (2001) made a distinction between "educational technology" and "access technology" (often called "enabling" or "assistive" technology) when applied to the area of visual impairment and education. The former is described as having an explicit educational aim, while the latter is used in conjunction with mainstream software in order to provide "access" to the underlying functions. While in practice the two overlap, an important emphasis of the literature is on the presentation and control opportunities that technology affords that make it particularly valuable in the education of visually impaired people. For example, computers can enhance visual presentations (for example backlit screen displays of large text in a range of colour combinations) or provide alternative presentations (for example speech output of screen-based text).

The research falls into the following areas:

- Access to the curriculum and information
- Teachers' views and training

5.4.2 Access to the curriculum and information

Computer technology has become almost ubiquitous in the education of visually impaired children, as it provides access to information that would otherwise be difficult or even impossible to obtain (for example screen reading software, screen magnification software, Braille translation software).

To some extent these access qualities of technology are reflected in much of the research that has been carried out in the area, most notably descriptions and case studies of the use of ICT. Examples of such studies include work by Lancioni (2007) that describes the use of switches with MDVI children; by Douglas et al. (1994), who describe the teaching of touch-typing; by Sales (2006), who describes screen magnification software; by Mioduser et al. (2000), who describe software for developing spelling; by Douglas and Dickens (1996), who describe the use of concept keyboard and tactile overlays for teaching early tactile reading to

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children with MDVI; by Schweigert and Rowland (1992), who present case studies of using augmentative and alternative communications (AAC) technology successfully with children with MDVI; and by Jones (2004), who describes teaching both partially sighted and blind children internet access skills.

While these studies are persuasive, in that they demonstrate activities that visually impaired students may otherwise find difficult to do, they tend not to have a "comparative" design: that is, they rarely compare performance either with that of sighted children or with that of children with a visual impairment who are not using the technology. This can be problematic, on two grounds. Firstly, the literature on the use of technology can be dismissed as providing little evidence of educational impact. Secondly, technology can be seen as a solution to *all* the difficulties faced by visually impaired children in obtaining access to information. As an example, a recent study by Evans and Douglas (2008) compared the performance of blind and sighted students accessing on-line learning material. The research demonstrated that while the blind students could access the material when using screen readers (therefore demonstrating the importance of screen-reader technology) the participants took significantly longer (twice as long) to complete the tasks. The authors noted that "if learning materials take impractical amounts of time for people who are blind to access … people who are blind may simply choose not to access the materials and will be effectively excluded from learning."

Another angle on research in the area of ICT is a consideration of the teaching activities that revolve around the technology. In a series of studies Bozic and colleagues emphasised that the educational activity linked to the educational software was just as important as the software itself (Bozic, Hill et al. 1993; Bozic 1995; Bozic, Cooper et al. 1995). For example, Bozic, Cooper et al. (1995) experimented with different ways in which a teacher engaged a 4-year-old language-delayed visually impaired girl in three different computer-based joint activities, each one designed to give her opportunities to practise the expression of specific semantic relations. The results show that two out of three activities were successful in eliciting the required communication.

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In another study Sanchez and Flores (2005) and Sanchez and Elias (2007) described the development and testing of specialist audio-based software for teaching mathematics and science. Learning gains were observed following the use of the software.

Skills with ICT have been emphasised as important in later life. Trief and Feeney (2003) surveyed visually impaired students who had successfully completed college courses about the importance of various competencies acquired before going to college: computer, assistive technology and keyboarding skills were all emphasised as important. Douglas et al. (2007) in a large-scale survey of visually impaired people found that adults who used technology were more likely to be in employment.

5.4.3 Teachers' views and training

The literature contains examples of work in relation to teachers' views and training needs in relation to ICT. Parker et al. (1990) report the responses of 120 American teachers and rehabilitative specialists of "multiply handicapped" blind and deaf-blind children to a survey on their use of assistive technology. The respondents reported problems in all areas covered by the survey but especially mentioned the need for resources to assess and match students to appropriate devices and to generate more training for themselves. Mack et al. (1990) also noted the importance of incorporating the training of access technology in training programmes for teachers of visually impaired students. Potentially, these articles reflect a time when technology was rapidly emerging and there may have been concern that professionals did not have up-to-date skills. Even so, more recent American studies have noted concern about teachers' knowledge of technology. For example, Murphy et al. (2008) surveyed 192 "teachers of young children with visual impairments" and noted that they rarely reported using assistive technology. Abner and Lahm (2002) surveyed teachers of students of visual impairments in Kentucky to identify the assistive technologies their students were using and to identify the teachers' possible unmet training needs. Although the teachers had access to and used computer technologies, they lacked the training and support for teaching specific technologies to their students, and so only half their students used these technologies.

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5.4.4 Summary

Many studies have demonstrated the importance of ICT in supporting the education of visually impaired children. Some of the technology may have particular educational advantages and uses in teaching in particular curriculum or additional curriculum areas (for example Braille, visual training, touch-typing) and so have particular benefits in working with children with MDVI.

Some of the "access technology" is critical for access to the curriculum generally (for example access to word-processors, web browsers, e-mail, and other applications). In spite of the undoubted power of access technology, research also shows that gaining access to information is still often a slower process for visually impaired students than for their normally sighted peers. Nevertheless, the development of on-line resources following accessibility guidelines will ensure that visually impaired students can access the information (albeit more slowly).

The benefits of being taught to use technology are recognised by older visually impaired people, and having these skills seems to be associated with greater employment success among visually impaired adults. Nevertheless, the literature also suggests that there may be challenges in teaching children with a visual impairment to use this type of technology, because of possible gaps in the knowledge and skills of the teachers.

Key points

- "Access technology" is an important tool for visually impaired children in gaining access to the curriculum. Children do, however, require appropriate teaching in order to make effective use of access technology.
- In spite of developments in access technology for children with visual impairment, there is evidence in the literature that access to information may be slower compared with sighted children.
- Beyond general access, technology offers the potential for the teaching of particular curriculum areas, for example visual training and Braille, and has particular benefits in working with children with MDVI.

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5.4.5 Recommendations: ICT

"Access technology" (for example screen magnifiers and screen readers) is an important tool for visually impaired children in accessing the curriculum. Beyond general access, technology offers the potential for teaching particular curriculum areas (for example visual training and Braille) and has particular benefits when working with children with MDVI. It is recommended, therefore, that

- visually impaired children should be given appropriate training in order to make effective use of access technology (for example training in touch-typing, training in the use of particular access software);
- educators should also draw upon relevant technology to support their teaching of particular curriculum areas to visually impaired children.

5.5 Low vision training

5.5.1 Introduction

Influential work by Barraga (e.g. Barraga 1964; Barraga and Collins 1977; Barraga 1990) concluded that principles that apply to visual development are as valid when the system is impaired as when there is no impairment. It was argued then that encouraging children to use their residual vision was essential to developing its efficient and effective use. This was at odds with previous beliefs that the vision of children with a visual impairment could not be developed and that educators should not encourage its use. This shift in view had far-reaching implications: (1) children should use their residual vision, and (2) relevant teaching (including the use of appropriate visual aids) and stimulation were important tasks of the educators of children with visual impairment.

The related literature falls into four overlapping areas:

- Functional vision assessment
- Visual stimulation and training (including MDVI)
- Low vision aids: training and use
- Delivery of low vision services

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5.5.2 Functional vision assessment

A number of substantial studies have analysed visually impaired children's "functional" vision and developed assessment procedures that can be used by educators to inform visual training programmes. These procedures are distinct from (but related to) the visual assessments carried out by optometrists as part of a low-vision assessment (discussed below). A prominent assessment tool in the UK and elsewhere in the world is "Look and Think" (e.g. Chapman et al. 1989, though it should be noted that this is no longer in production), which identified eighteen different visual skills that a teacher could assess through the use of test materials and a check-list (for example visual discrimination, visual matching, perception of symmetry, hand-eye co-ordination, and colour differentiation). This was developed through extensive work and testing with partially sighted children. Others have developed similar tools (e.g. Blanksby and Langford 1993). Aitken and Buultjens (1992) developed a tool specifically for children with MDVI ("Vision for Doing").

As "Look and Think" is no longer in production, it is likely that teachers draw on less formal approaches (similar to Look and Think procedures but without the associated empirical testing) to carry out these assessments and associated teaching activities. For example, Erin and Paul (1996) list a range of approaches, and substantial lists can also be found as part of many on-line resources (e.g. the Perkins Scout web site[2]).

Given that these assessment tools were developed for teachers, they were often linked to teaching activities. (See the next section). For example, Look and Think specified fifteen related activities that could be used for teaching.

5.5.3 Training of visual skills (including MDVI)

Visual stimulation or visual training includes a range of interventions that reflect the range of visual skills or functions defined by the assessments. (See the previous section.) This ranges from relatively basic visual functions, such as visual attention, to complex functions, such as tracking and matching. A number of publications describe case studies of visually impaired children engaging in these tasks. Bernstein (1979), in the first of three papers, describes

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[2] http://www.perkins.org/scout/vision-and-blindness/functional-vision-assessmen.html, accessed 9 October 2009.

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classroom activities, Jose et al. (1980) in relation to children with MDVI, and Tobin (1996) in relation to the use of technology. In line with this, in a national survey of educators of visually impaired children in the UK, Bozic (1995) found that more than half the respondents used "Look and Think", and teachers "yielded an almost unanimously positive response" to the benefits of visual training (p. 63). Nevertheless, Dunnet (1994) questions the justification for some of the tasks included in the check-list, concluding that they "rely on age, intelligence and level of experience, rather than on vision" (p. 15).

Evidence that demonstrates a more objective effect of such interventions is less conclusive. Leguire et al. (1992) identified a positive effect of visual stimulation in a comparison study of pre-school visually impaired children. Nevertheless, the extensive review by Vervloed et al. (2006) concluded that empirical evidence was ambiguous. They demonstrated that visual stimulation in artificial surroundings that is non-contingent on the behaviour of the child may be counter-productive. More positively, however, the training of visual functions seems fruitful whenever skills that are environmentally valid and adapted to the individual needs and task demands of the child are trained. This is perhaps in keeping with the approaches described by Bozic and colleagues (e.g. Bozic et al. 1993), which showed the importance of social context when working with young children using visual stimulation software and the role of control devices that mean that visual stimulation and feedback are contingent on the child's behaviour (i.e. give the children control over their visual environment). Lueck et al. (1999) also described an improvement following visual training with young children with cortical visual impairment (CVI).

Possibly the most significant and most influential study in the field of visual training was carried out by Sonksen et al. (1991). The study was a randomised control trial in which both matched groups of visually impaired children received a general developmental programme but only one a functional vision programme. Those who received the functional vision programme improved more in their functional vision. Even so, Vervloed et al. (2006) noted that evidence was sparse and that more research was needed.

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5.5.4 Low-vision aids: Training and use

As also noted under the "literacy" topic of this review, the use of low-vision aids (LVAs) is an important area of educational intervention for many visually impaired children. It should be noted, however, that the use of LVAs is not just for the purposes of accessing print, although this makes up the majority of the empirical literature.

In regard to access to print, Barraga (1990) stated that "evidence is conclusive that using optical devices with regular print materials is just as efficient, no more fatiguing, increases accessibility, and is far more cost effective than large print. Nevertheless, large-print books continue to be used long after they are actually needed" (p. 15). Even so there is continued debate and mixed practice in this area, in spite of Lussenhop and Corn's (2002) more recent review of empirical studies, which came to the same conclusion as Barraga.

Much of the literature describes a relatively low take-up of LVAs by children and young people. Mason (1999) investigated this, directly noting that pupil peer pressure was a major reason for the rejection of LVAs. It was also clear that not all teachers had clearly defined criteria for judging whether LVAs were being used effectively. This latter point reflects a possible lack of clarity about when and how to use LVAs. For example, Jackson (1983) raised concerns about introducing LVAs at early stages of reading development. These uncertainties go beyond the use of LVAs for reading print but permeate their broader application, including by children with MDVI.

Gould and Sonksen (1991) and Richie and Sonksen (1989) described using near-vision LVAs with pre-school children (for example for looking at pictures and real objects). Nott (1994) described similar work with children under the age of 7. Mason (1999) described successful use of LVAs among mainstream secondary pupils in the UK (although take-up was low, as already noted).

Empirical studies of the use of LVAs in education beyond reading print are relatively sparse. Nevertheless, a British study by McLinden at al. (2002) investigated the use of LVAs with children with MDVI. Of the children surveyed, 6% were reported as using "optical" LVAs (i.e. CCTV, dome magnifiers) and 10% as using non-optical LVAs (i.e. reading stand, task lighting, etc.). Follow-up interviews were also undertaken to explore the rationale behind teachers' use

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or non-use of LVAs with different children who have MDVI. A range of factors was identified, including potential difficulty or barriers in the assessment process and having aids prescribed, as well as the potential behavioural and motivational characteristics of some of the children.

Bozic and Lambert (1996) also presented research investigating the use of LVAs with children who have MDVI. They explored the "creative" use of CCTV for "curriculum access", which included group work and exploring objects rather than traditional individual print-based activities. Although the number of children in the study was small, the authors concluded that the use of CCTV with this group of children "challenges our common sense notions of how this form of technology is meant to be used. We can learn an important lesson here: technology is a tool that can be deployed in a variety of ways and we need to develop confidence to experiment with the possibilities that it affords" (p. 27).

5.5.5 Delivery of low-vision services

Corn et al. (2003) provide a two-part paper. Half the paper deals with the efficiency and effectiveness of the use of LVAs by children when reading compared with the use of normal-sized print (including a cost-effectiveness analysis). The other half of the paper describes a USA-based case study of an LVA assessment, prescription and training process. A key feature of their description is the multi-disciplinary nature of the stakeholders involved, including ophthalmologists, optometrists, low-vision therapists, teachers, and rehabilitation workers.

This multi-disciplinary approach is described as critical by many significant sources in the literature (e.g. Jose et al. 1988; Lennon et al. 2007; Lubke and Corn 1983; Hofstetter 1991; Goldie et al. 1986; Gould and Sonksen 1991; Zammitt et al. 1999). The reason such an approach is required is that LVAs are often prescribed in low-vision clinics (often, though not always, attached to hospitals), and there is a recognition that educators and parents are the key to ensuring the effective implementation of LVAs beyond the clinic, as well as having an important role in the assessment process. Emphasising the role of non-clinical assessments of the functional vision of visually impaired pupils (in this case children with MDVI), Hall et al. (1991) describe the importance of parents' views when assessing, as well as the use of, clinical and modified clinical procedures.

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The successful implementation of the use of LVAs among children has already been reported as problematic (e.g. Mason 1999). In the model of Lennon et al. (2007) they describe one specialist hospital. Their principal conclusion is that a comprehensive assessment of visual function, when reported to other professionals, should permit more relevant adaptations to be incorporated in the educational strategies adopted for the child. Zammitt et al. (1999) argue that the active management and evaluation of LVAs in school is essential to improve the use of LVAs (and teachers are crucial in this process).

5.5.6 Summary

Teachers are increasingly involved in the assessment of children's functional vision, and a range of non-clinical procedures has been developed to help in this process. Children with MDVI may have undetected visual potential that can be identified with such assessment tools. These assessment procedures inform professional understanding of the children's visual function and the effect this might have on challenges they may face in the classroom. In addition, they inform visual training and visual stimulation programmes (some of which are explicitly linked to the assessment procedures).

It is argued that early visual stimulation can increase the neural foundation for vision and visual-motor function in visually impaired infants and in children with additional disabilities who have cognitive delay. The evidence for the impact of some visual training programmes seems ambiguous, although interventions that have some functional meaning to the child and in which they have an active role have more evidence of impact. Technology can provide a highly controllable visual environment that can be useful for supporting such work.

Low vision aids (including optical aids, for example magnifying devices, electronic aids, for example CCTV, and non-optical aids, for example modified task lighting) can help visually impaired children to obtain optimal visual experience of learning materials and can be successfully introduced to children before school age and to children with MDVI. There are some concerns and evidence of under-use of clinically prescribed aids by children in school. Some of this appears to be linked to pupil peer pressure (perhaps particularly relevant when visually impaired pupils are in mainstream schools and may not want to look "different"), but teachers also were sometimes unclear about how to use LVAs effectively (empirically shown in

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the UK but probably true elsewhere). This may also be linked to the process of prescription and assessment.

Improvements in the clinical assessment of low vision and the availability of low-vision aids led to a realisation of the need for greater co-operation between clinical and education services and of the need for co-ordinated provision in relation to low-vision services for children. Models presented in the literature highlight the importance of multi-disciplinary teams.

Key points

- The majority of visually impaired children have some remaining or "residual" vision. Understanding their visual function is important for helping professionals to design appropriate educational interventions. Assessment tools exist to support this process.

- It is also believed that "visual stimulation" training can support the development of a child's functional vision.

- Evidence is not conclusive of the effect that visual training with young visually impaired children has. However, it is likely that some kinds of functional vision training programmes have a positive impact.

- The positive impact of low vision aids in supporting children to gain access to information is well established. Even so, there is evidence of a low up-take of LVAs by children in schools (possibly because children do not want to look "different" and because of a lack of knowledge on the part of the teacher). This has implications for the training of staff members and of pupils.

- There is evidence that LVAs can be successfully used with children with MDVI (although practice seems scarce).

- Successful low-vision training, whether with young or older children, requires the involvement of a multi-disciplinary team, because of the range of skills and views required (for example clinical, optometric, pedagogical, and parental).

5.5.7 Recommendations: Low-vision training

The majority of visually impaired children have some remaining or "residual" vision. It is recommended that

- specialist services should carry out regular functional visual assessments of visually impaired children to enable professionals to design appropriate educational interventions;
- such assessments should draw upon the views, expertise and assessments of a broad range of stakeholders, including optometrists, ophthalmologists, teachers, and parents;
- when low-vision aids have been prescribed, appropriate training should be provided for staff and pupils to reduce their low take-up in educational settings.

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6. Consideration of Implications for Ireland

6.1 Introduction

The key purpose of this review of the literature was to identify evidence of best-practice models and outcomes in the education of blind and visually impaired children. In addition, the invitation to tender requested the research team to consider the implications for Irish national policy.

In the methods section (2.2) we argued that research in the field of visual impairment has tended to concentrate on the concept of "access", with a more limited emphasis on research that is comparative in nature. This observation was reflected in the findings of the literature review: empirical evidence was found in the area of curriculum design and access, but in the broader policy context the evidence does not go beyond expert views and commentaries. For this reason the document included a "review context" (section 3) and "review focus" (sections 4 and 5). In the former we present key summaries of the literature, while in the latter we are able to make more specific evidence-based recommendations.

In this final section of the review we bring together the findings of the literature review and consider the implications for Ireland. A series of "Implications for Ireland" is therefore presented in relation to

(1) educational services for visually impaired children: teaching and curriculum requirements
(2) inter-agency working and systems
(3) educational infrastructure
(4) the role of special schools and specialist centres
(5) professional training
(6) the identification of visually impaired children.

The implications draw predominantly on the "Review context" (section 3) and the "Irish context" (presented in section 1) as well as on some informal discussion with practitioners and contacts in Ireland.

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Necessarily, the implications considered in this section are more interpretative than the recommendations presented earlier and reflect the review team's attempt to support the NCSE in applying the outcomes of the review to an Irish context.

6.2 Educational services for visually impaired children: Teaching and curriculum requirements

The review makes a distinction between "classroom and the curriculum" and "additional curriculum needs". This distinction is in keeping with the view expressed by many commentators in the literature, who make a distinction between visually impaired children's access to the "mainstream" (or "core") curriculum and their access to the "additional" curriculum. Precisely how curriculum areas are split between the two is debatable, but the general distinction is useful, both in organising the literature and—crucially for the purposes of this discussion—in designing services for visually impaired children.

The review provides strong evidence that visually impaired children have particular *teaching* and *curriculum* needs. With regard to *teaching and access to the mainstream curriculum*, children with visual impairment require modified educational provision to enable them to gain access to the curriculum. The review presents evidence of this necessity in relation to

- an assessment of their learning needs
- the teaching strategies adopted
- approaches to formal examinations
- approaches in relation to the teaching of literacy (including print and Braille).

With regard to the *additional curriculum*, there is evidence that children with visual impairment require additional intervention in order to develop skills in the following areas:

- Mobility and independence
- Social and emotional development
- The use of ICT
- Low vision

The relevant sections provide summaries of evidence and include recommendations for those designing services for visually impaired children. (These are also presented in the

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Executive Summary.) The recommendations presented in the review offer the basis for developing national standards that can be used for

- designing and developing service provision
- reviewing service delivery.

Other countries have developed similar standards (for example in the UK, DfES 2002). Reference could be made to those documents if it was decided to develop similar standards in Ireland.

Implications for Ireland

The review makes a clear distinction between the "mainstream" and "additional" curriculum. Drawing upon this, the review offers evidence-based recommendations of the teaching and curriculum requirements of educational services for children with a visual impairment. The recommendations presented in the review offer the basis for developing coherent national standards that can be used for

- designing and developing service provision
- reviewing service delivery.

Reference can be made to standards that exist in other countries (for example the UK), but central to the development of the standards should be the evidence-based recommendations and the Irish policy and service context.

The application of such standards could be used to determine the adequacy of current models of learning support for visually impaired children in Ireland and could determine whether additional models of learning support and resource need to be considered.

6.3 Inter-agency working and systems

Effective links between health and education services are important for identifying children with a visual impairment. Clear referral routes between agencies are required to enable education professionals to offer appropriate support to visually impaired children and their families as early as possible after diagnosis.

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The literature identifies a number of other areas in which professionals from different disciplines and employed by different agencies can work together for the benefit of the visually impaired child. In the area of "low-vision training", links between professionals can ensure that children with visual impairment are prescribed (and trained in the use of) the appropriate low-vision aids. (Lennon et al. 2007 offer an example of how a hospital "low-vision clinic" can be linked with visiting teacher services in the UK.) In the area of mobility and independence, teachers may often work with professionals outside the field of education, such as rehabilitation workers. Again, communicating expertise in the best interests of the child is crucial (Pavey et al. 2002).

It is perhaps in the area of early intervention that inter-agency working is most obviously critical (not least because of the process of diagnosing a visual impairment). Although children of pre-school age are included in the case load of the visiting teacher service in Ireland, and visiting teachers provide advice and support in the use of low-vision aids to other staff members, there appears to be no other visual-impairment-specific early intervention services except in Dublin. This contrasts with the developing specialist provision for young children with autistic-spectrum disorders. Although the low incidence of severe visual impairment and the demography of Ireland make the provision of accessible early intervention services outside the greater Dublin area particularly challenging, consideration could be given to improving such services.

The recently developed Developmental Journal in the UK (see Dale and Salt 2007) provides a model of intervention and inter-disciplinary working that provides an up-to-date understanding of early child development in visually impaired children and supports the sharing of information between families and professionals. The intervention links many aspects of the "additional curriculum", such as early social, visual and motor development. The critical role of the family in such a process cannot be overemphasised.

Implications for Ireland

Given the importance of ensuring that there are effective links and referral routes between health and education services for identifying and supporting children with visual impairment,

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it would be helpful to review areas of provision that particularly demand inter-disciplinary communication. These areas include:

- the provision of low vision services
- the diagnosis, planning and delivery of early intervention programmes for visually impaired children and babies
- mobility and independence education.

6.4 Educational infrastructure

The literature review has highlighted that access to the curriculum by visually impaired pupils requires the availability of additional materials and equipment. Most notable among these are appropriate ICT, LVAs and related equipment, Braille materials and equipment, modified print material, curriculum materials (for example textbooks and teaching aids), mobility equipment, and examination and assessment materials.

Again this requires the linking of a range of services. For example, the National Centre for Technology in Education (NCTE) provides ICT equipment needed by visually impaired pupils and students (although the recent AHEAD 2008 reported that the process for obtaining technological aids needs to be streamlined). Braille texts required by pupils in mainstream schools are produced by the Braille unit at St Joseph's Centre and the National Council for the Blind (NCBI). The Advisory Group on Reasonable Accommodations provides a route for requesting modified examination papers. LVAs appears to be available from the NCBI in the different localities, and some optometrists also do LVA assessments in their areas. The review team is less clear about how mobility equipment is provided.

Implications for Ireland

The literature review shows that access to the curriculum by visually impaired pupils requires the availability of additional materials and equipment. The processes by which equipment and resources are provided to visually impaired pupils and their families as well as their teachers could therefore be usefully reviewed to ensure that clear procedures exist. This review might also ensure that there are mechanisms for the rapid replacement or maintenance of damaged equipment.

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6.5 The role of special schools and specialist centres

There is support in the literature for a continued and expanded role for special schools for the visually impaired that would allow them to work in partnership with mainstream schools to facilitate effective inclusion. The proposed roles include the preparation of both specialist and mainstream class teachers, the provision of short, intensive placements to children from mainstream settings, the supply of specialist resources, the development of specialist approaches to delivery of the curriculum, and the support and assessment of pre-school children.

In addition to making provision for the education of pupils with visual impairment, the designated special school for pupils with a visual impairment (St Joseph's) offers a considerable range of services to those affected, including Braille production, an assessment service, an early intervention service, and training for personnel from Ireland and beyond. Consideration could be given to resourcing St Joseph's to enable it to develop these services further. As an example, the development of professional training might be enhanced through developing a link between St Joseph's and a higher education institute in Ireland in addition to existing links with the UK.

Implications for Ireland

The existing designated special school for pupils with a visual impairment in Ireland plays an important role in providing resources and related services. Consideration could be given to providing resources to St Joseph's Centre for the Visually Impaired to enable it to develop these services further. As an example, the development of professional training might be enhanced through developing a link between St Joseph's and a higher education institute in Ireland in addition to the existing links with the UK.

6.6 Professional training

A key implication of the review is that professionals involved in teaching children with visual impairment require training in knowledge and skills to teach the children "appropriate things" (for example components of the additional curriculum) in the "appropriate way" (for example through specialist strategies). In the "review context" we present a review of the

literature in relation to teacher training and visual impairment (section 3.4). The literature shows that defining the "competencies" that teachers require for working with children with a visual impairment is an approach adopted in some countries. More recently in the UK the competencies have been subsumed into the "extension" standards for specialist teachers of the visually impaired that were issued as part of the National Special Educational Needs Standards (TTA 1999). The development of similar standards or competencies for teachers who work with children with a visual impairment might be useful in Ireland, as they would provide guidance for the training required by those working with visually impaired children.

Although no specialist qualification is available in Ireland for teaching pupils with visual impairment, informal discussions suggest that the majority of teachers working in the visiting teacher services have gained a specialist qualification through completing a distance education course offered by the University of Birmingham. In contrast, figures collected from the special school sector in 2006 suggest that at that time there was only one serving teacher in a (visual impairment) special school holding such a specialist qualification (Special Education Department, St Patrick's College 2007). The DES should therefore consider as a priority how appropriate specialist training can be made available to teachers working with this group. Suggestions about how this might be achieved in practice include:

- registering students on appropriate courses in the UK (as has been done in the past)
- a partnership or franchise arrangement with a British university (drawing on a model developed in the early days of the provision of ASD-specific training)
- the development of a distance or blended model course, such as is now available for teachers of pupils with ASD
- an all-Ireland solution, perhaps capitalising on expertise available in Queen's University, Belfast, and including St Joseph's, as considered above
- constructing add-on modules specifically related to visual impairment that could be added to existing SEN qualifications (for example a postgraduate diploma in special educational needs).

As well as the training options available for teachers, consideration should be given to the training routes for other professionals who work with visually impaired children. As an example, the literature reviewed in section 3.3 suggests that the role of "teaching assistants"

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is an increasingly important mechanism for the provision of learning support in many service designs (including Ireland, through the use of "special-needs assistants" in a care role). Evidence from this literature suggests that teaching assistants can best support children with visual impairment if they have an understanding of visual impairment and how it affects the individual. Consideration should therefore be given to the training of special-needs assistants to support them in developing such an understanding of a visual impairment and its importance in their role.

The review also highlighted Braille teaching as requiring approaches and materials that are different from those employed in the teaching of print reading. No training is available in Ireland at present to enable teachers to acquire a qualification in the teaching of Braille, though it is hoped that a certificate of competence in Braille will be available through St Joseph's Centre from September 2009. (It should be noted, however, that this is not a qualification in *teaching* literacy through Braille.) A recent report from AHEAD reports anecdotal concerns about the level of support in Braille teaching for students at the second level (AHEAD 2008). This highlights that this training route needs attention.

Similarly, training for staff members with regard to mobility and independence education has until recently been available through St Joseph's, which ran a diploma course in orientation and mobility and one in independence and technical skills in conjunction with University College, Worcester. These courses have now ceased, so there is currently no training available in Ireland in this key area.

However, another programme (again involving University College, Worcester, and St Joseph's Centre) for training parents and professionals in the area of visual impairment and education (including special-needs assistants) is likely to be launched in 2009. This has recently been approved and validated by the University of Worcester.

While some of these training paths may be useful, a general review of training routes available for those involved in the teaching of children with visual impairment would be helpful.

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Implications for Ireland

The review suggests that the teaching of children with visual impairments requires input from professionals with appropriate training.

- The development of standards for teachers who work with children with a visual impairment may be useful, as they will provide guidance for the training required by staff members working with visually impaired children.
- A review of appropriate training routes for professionals working with children with visual impairment would be helpful. This includes training routes for specialist advisory teachers, special-needs assistants, and potentially short courses, particularly in the area of Braille teaching and mobility and independence education.

6.7 Identification of visually impaired children

The identification of visually impaired children is an important part of the process of providing an appropriate education for them. In the "review context" we present a short review of recent literature in relation to the nature of the visually impaired population (section 3.2). The key findings outlined in this section were:

- There appears to be no detailed study of the visually impaired population in Ireland.
- In relation to the UK, while there are no consistent estimates of the prevalence of severe sight problems in children aged up to 16 (partly because of the inconsistent use of definitions), the figure is likely to be between 10 and 20 per 10,000.
- There is clear evidence that a significant proportion of visually impaired children (more than half) have disabilities in addition to their visual impairment (in many cases multiple difficulties, including severe or profound learning difficulties).

Assuming similar prevalence to that in the UK (a conservative estimate of 15 per 10,000), and based on Ireland's population of school age (first level: 455,782; second level: 339,128; 2003/04 figures from the Central Statistics Office 2008), then an estimate of the number of school-age children with a visual impairment would be approximately 1,192. This compares with the case load of 780 school-age children supported by the visiting teacher service. (See section 1.3, Educational provision for students with visual impairment in Ireland, table 1.)

Given this discrepancy, a more formal analysis of the prevalence and the nature of the visually impaired population would therefore be desirable. The findings of the 2006 National Disability Survey (CSO 2008) suggest that there is a total of 2,700 children up to the age of 17 who have "a moderate level of difficulty seeing" or greater (1,053 with "a lot of difficulty seeing" or "cannot see at all"). This data could provide a starting point for a more detailed analysis.

As described in the review (section 3.2), an approach that might have particular relevance to Ireland is reported by Ravenscroft et al. (2008). This is reported as a "novel" method of profiling childhood visual impairment in Scotland. Crucially, the method draws on information provided by parents, teachers and health professionals. While the authors note that what they describe is not an *epidemiological* study, it does (or will in time) identify *all* the children with visual impairment in Scotland. The critical feature of the study is that it brings together data from different sources into a coherent whole, serving to connect different stakeholders and to give policy-makers the critical data needed for planning services.

If Ireland is to review its methods of identifying and referring visually impaired children, then drawing on established systems developed in Scotland could be very helpful, given similarities in population size and density in the two countries.

Implications for Ireland

The numbers of children with a visual impairment being supported in the education system at present seem low (based on prevalence estimates in the UK). It may be that children with visual impairment—particularly those with additional disabilities—are not known to the visiting teacher services and are not receiving the services they require. A formal analysis of the prevalence and size of the population of visually impaired children is therefore required. Given similarities in population size and density, the established method of profiling childhood visual impairment in Scotland is one option that could helpfully be considered for use in Ireland.

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7. APPENDIX: REFERENCES FROM REVIEW CONTEXT

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