



**EVIDENCE OF BEST PRACTICE MODELS AND
OUTCOMES IN THE EDUCATION OF DEAF AND HARD-
OF-HEARING CHILDREN:
AN INTERNATIONAL REVIEW
EXECUTIVE SUMMARY**

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Introduction

Hearing loss in childhood is relatively infrequent, but when it occurs it typically has real implications for children's development and academic achievement. Many countries have recently instituted newborn hearing screening and early intervention programmes for deaf and hard-of-hearing (DHH) children. These programmes offer children and their families services that can help to provide a strong foundation for learning in various settings. Yet programming and support services for DHH children frequently proceed on the basis of tradition, intuition and administrative convenience rather than being based on research evidence. As a result, the true benefits of various educational and developmental programmes and their generality for various subgroups of DHH children are often unclear. Observed outcomes may be due more to the individual (or individuals) providing or receiving those services than to the services themselves.

In part because of the widely varying characteristics and experiences of DHH children and their families, the outcomes of various programmes may be inconsistent and may sometimes appear contradictory. The population of DHH children has also changed with improved technology (for example digital hearing aids and cochlear implants), changes in the causes of early-childhood hearing loss, and recognition of the fact that both signed language and spoken language are appropriate communication alternatives in raising and educating DHH children.

The National Council for Special Education (NCSE) is required to conduct research that may be used to assist in the development of policy advice on special education matters to the Minister for Education and Science. In order to provide an evidence base to inform policy advice on the education of DHH children, the NCSE commissioned an international review of "best-practice models and outcomes in the education of deaf and hard-of-hearing children." What follows is a summary of that report.

The *Best Practices* report provides a detailed review of what we know and what we do not know about educating DHH children. That is, it describes existing research concerning various educational practices and their outcomes while also pointing out popular beliefs

about raising and educating DHH children that lack research support. The existing literature is reviewed, with special reference to Ireland and the Education for Persons with Special Educational Needs Act (2004) (EPSEN). It considers both current practices and alternative directions for the future (for example the extent to which education and health services in Ireland need to be co-ordinated in meeting the needs of DHH children). The investigators made use of periodicals, books and other available resources, but the report consists primarily of information obtained from professional and governmental sources with verifiable outcome data. Additional information was obtained by the authors from parents, professionals and students during a week's visit to Ireland. Such information is distinguished from research evidence in the report.

The literature review and preparation of the report were conducted by Professor Marc Marschark of the Center for Education Research Partnerships at the National Technical Institute for the Deaf, a faculty of Rochester Institute of Technology in Rochester, New York, and honorary professor in the Moray House School of Education at the University of Edinburgh and the School of Psychology at the University of Aberdeen, and Dr Patricia E. Spencer, formerly of the Department of Social Work at Gallaudet University, Washington, and the Gallaudet Research Institute.

The context of education for deaf and hard-of-hearing children in Ireland

Services relevant to early intervention for DHH children in Ireland, including the identification of hearing loss, pre-school intervention, and early audiological support, are under the auspices of the Department of Health and Children, whereas educational services are overseen by the Department of Education and Science (DES). Day-to-day educational administration and management responsibility reside with the Directorate of Regional Services through its Regional Office network. The divided responsibility for DHH children may result in (1) diagnoses of hearing loss occurring later (and being more expensive) than is now possible, (2) early intervention and pre-school experiences not being available to all DHH children who would benefit from them, and (3) limited use of

hearing-related technologies in the classroom and at home. The *Best Practices* report demonstrated the internationally recognised importance of these areas for DHH children.

There are approximately two thousand children of school age in Ireland with hearing losses that could interfere with normal teaching and learning activities. At present there are three categories of educational placement for these children: separate programmes (schools for the deaf), special classes or units within ordinary schools, and ordinary classrooms. According to figures in the report, more than three-quarters of DHH students are enrolled in ordinary classrooms and receive support from resource teachers, visiting teachers, and special needs assistants (SNAs).

Everything you wanted to know about hearing loss... but were afraid to ask

Only one or two out of every thousand babies is deaf at birth, because of either hereditary or medical factors. More children lose significant amounts of hearing during early childhood through illness, accidents, genetics, and other causes. Obtaining accurate counts of the number of DHH children in a particular country is always difficult, and Ireland is no exception. Data drawn from the 2006 Irish National Disability Survey, however, indicated 3,283 children up to the age of seventeen who had hearing-related difficulties in everyday activities, ranging from “a moderate level” to “cannot do at all”; 55.6% of those were reported to have had their hearing loss from birth.

According to the DES, DHH children eligible to receive special-education services in Ireland are those with “a hearing disability that is so serious [as] to impair significantly their capacity to hear and understand human speech, thus preventing them from participating fully in classroom interaction and from benefiting adequately from school instruction ... *(This category is not intended to include pupils with mild hearing loss)*” (emphasis in the original). The provision of services only to students with greater hearing loss is noteworthy, because, as described in the report, recent evidence shows that even children with “mild”

or “minimal” hearing loss (hearing threshold as low as 16 dB) are at risk academically, particularly with regard to literacy.

According to information provided by the NCSE, “all pupils in primary schools with low achievement in English or mathematics, including those with mild hearing loss, are eligible for additional teaching support under the general allocation model (GAM). Pupils in post-primary schools who have low achievement in English or mathematics are eligible for learning support.” Therefore DHH children—including those with mild hearing loss—may receive additional services only after they have already fallen behind academically in the two areas that have been demonstrated to be of greatest challenge for this population: literacy and mathematics. Insofar as research clearly indicates that these children are at risk, the evidence suggests that they would be served more effectively, efficiently and economically if such service was provided early on, thus possibly preventing or at least reducing such delays.

Non-verbal measurements of intelligence and cognitive ability indicate that DHH students are just as capable as their hearing classmates, but their academic achievement often falls below that of hearing children. When effective early intervention is provided, the language and early literacy skills of DHH children are closer to those of hearing children, although barriers remain. For example, children who are provided with fluent models of sign language from their early months can acquire (visual-manual) language at the same rate as their hearing peers. Better language skills are associated with higher literacy skills, regardless of whether spoken or signed language is used and whether or not the children have cochlear implants. Together with society’s recognition of the rights and potential of persons with hearing loss, the use of natural signed languages has led to more flexibility in the way that language support is provided to DHH children and their families during the early years and provides increased access to learning.

A lot of evidence indicates the benefits of such technologies as cochlear implants in receiving and producing spoken language and in supporting early literacy. Not all children benefit from implants, however, and researchers are trying to discover the factors that support or interfere with the effectiveness of implants for individual children. In this regard

it should be kept in mind that cochlear implants are used only for children with the greatest hearing loss and are not appropriate for those with milder loss. Cochlear implants do not give deaf children the same hearing as hearing children but hearing that is more like that of children with moderate to severe hearing loss who use hearing aids (or children with mild loss without hearing aids).

DHH children are more likely to have multiple disabilities than hearing children, thus creating difficulty for service providers as well as for interpreting available research. Based on the literature, it is estimated that 30 to 40% of DHH children have other developmental challenges, which can include cognitive, motor, social-emotional, attention and learning disabilities. Any of these can have negative effects on academic achievement and personal growth.

Emerging realities in the education of DHH children

In summarising the available research—or just interpreting our everyday experience—two qualifications must be kept in mind. The first is that just because two things are related (such as the price of petrol in Ireland and in China) does not mean that one causes the other: both may be caused by something else (for example world demand for oil). In particular, how much hearing children have does not predict (or cause) their relative success in education. Rather, hearing loss interferes with effective language, communication and social experience, which in turn creates barriers to learning. Secondly, language and learning influence and build on each other. Thus, the more a child knows and the more language they have the easier it is to learn. The further behind they get the more difficult it is to catch up.

The *Best Practices* report reveals several emerging realities with regard to DHH children that must be considered if progress is to be made in improving their academic outcomes.

The identification of hearing loss and the immediate provision of effective intervention services can raise the general levels of language skills attained by DHH children, as well as later literacy and general academic achievement. Effective early intervention requires a

family-centred approach, with educators and specialists serving as consultants to parents and other carers. Support for family emotional needs and information about hearing loss and alternative intervention approaches must both be provided. Greater family involvement in a child's education and other activities leads to greater developmental and academic success. Positive social interactions and accessible language are important for a child's long-term development. The language approach chosen should be based on the child's strengths and family factors, not on predetermined educators' or administrative preferences. Once those decisions have been made, language progress should be monitored and changes made if circumstances and assessments indicate the need.

A variety of approaches to supporting language development is available, and each is effective for some but not all DHH children. Natural sign languages, such as Irish Sign Language (ISL), can be learnt relatively easily by children and can develop at a rate comparable to hearing children's spoken language. If a child has sufficient hearing for comprehension (with or without technological support), spoken language may progress with intensive therapy. Contrary to some claims, however, (1) the acquisition of sign language does not interfere with the development of spoken language (and often facilitates it), (2) sign language alone typically is not sufficient to provide a child with reading and writing skills, and (3) recent advances in early identification and intervention have helped to close the gap between the achievement of DHH and hearing children but have not eliminated it. Unfortunately, we still cannot predict an individual child's language development using a particular methodology or mode of communication (sign or speech).

Advanced hearing-aid technology and the use of cochlear implants are providing increased access to auditory information and spoken language for many children with hearing loss. Cochlear implants can support spoken language in a variety of language approaches. Positive effects tend to be greater with earlier implantation, because children have earlier access to language or environmental sounds (or both). Striking improvements in spoken language are being reported for children receiving implants before two years of age, but it is not clear whether rates of development will continue with age, and some children show less positive outcomes.

Evidence is accumulating with regard to educational approaches that can promote literacy skills regardless of the modes or approaches used for language development. In general, instruction by highly skilled teachers of DHH students in meaningful and interactive settings leads to better reading and writing skills than the instruction available in ordinary classrooms. Among DHH students, vocabulary and other reading skills continue to lag behind those of their hearing peers, and existing research provides no evidence that any particular method of reading instruction is superior. Early, shared (parent-child) reading and writing activities appear to provide support for emerging literacy skills, but the evidence is not strong.

Students with hearing loss show delays and deficits throughout the curriculum, not just in literacy. Most studies of academic achievement among DHH children deal with reading and mathematics, but lags are found throughout the curriculum. These difficulties appear to be related to such factors as underuse of metacognitive strategies (self-directed strategies for learning), decreased visual attention to information in the classroom, lack of language skills for understanding texts and information presented in class, and insufficient experience with problem-solving activities. Achievement tends to be highest when teachers are content experts and also knowledgeable about the needs and strengths of DHH children, rather than one or the other. It is essential that parents and teachers should hold high expectations for DHH children and should pass those values on to them.

Despite the social and political movement towards the inclusion of students with and without hearing loss in ordinary classrooms, specific placements have been found to have little effect on academic outcomes. Arguments about the benefits of separate and integrated (“mainstream”) education continue, but the evidence indicates that academic placement accounts for only 1 to 5% of the variation in DHH children’s achievement. Children appear to benefit most when placement decisions are based on their individual needs. With regard to social-emotional development (for example social maturity), findings point to the benefits from “congregated settings”—those in which a critical mass of children with hearing loss are within a larger group of hearing classmates. DHH students who are the only one in a class of hearing peers frequently report being lonely and without real friends.

Research involving DHH students, especially those in higher classes, indicates that their cognitive skills frequently do not match the instructional practices of mainstream classrooms. Specific differences between DHH and hearing students have been identified in a variety of areas relevant to academic performance (for example integrating information between sources and over time, flexibility in problem-solving). Some structured activities have been shown to promote better learning strategies, but these require specific and long-term support in order to generalise between subjects. Individual differences in learning styles among DHH students must be recognised and accommodated in both instructional techniques and educational materials.

Children with significant disabilities in addition to their hearing loss present more varied needs than those with hearing loss alone. Children with severe difficulties in social interaction or cognition may require highly specialised settings and curricula. The majority of children identified with multiple disabilities, however, show a combination of mild to moderate conditions that in combination magnify the challenges that would be presented by hearing loss alone. Given the great individual variability among these children, there is no well-defined evidence to provide specific guidance with regard to instructional practice.

Key findings

Beyond the emerging areas of interest described above, the report included a list of “Best practice issues and highlights.” The following examples were selected primarily because they represent new information or common misunderstandings with regard to DHH children:

- In the absence of early identification and intervention, countries pay a much higher monetary price for rehabilitation and support services than they would pay for universal newborn screening and early intervention.

- Early identification and intervention reduce developmental difficulties, but most DHH children arrive at school with significant language delays.
- There is little evidence that traditional oral programming results in DHH children attaining literacy achievements equivalent to those of their hearing peers.
- Studies show that some DHH children make age-appropriate progress using one of the oral approaches, but even advocates acknowledge that many, if not most, do not.
- Cochlear implants have increased the average rate of language development and speech skills among profoundly deaf children, but even with early implantation these children's language abilities, on average, remain below those of their hearing peers.
- In the hands of skilled users, sign-supported speech (speech and sign together) can be as effective as other forms of communication in post-primary up to university classrooms, but similar studies have not been conducted with younger students.
- True bilingual education (i.e. through English and ISL) requires specialised training and skills on the part of the teaching staff.
- After two decades of sign and bilingual programming in many countries, DHH children still have not matched the literacy achievement of their hearing peers.
- A deaf-centred approach to teaching will recognise that DHH and hearing students will have different learning styles, strengths, and needs.
- The use of signs allows early communication between parent and child and helps to build conversational skills while providing access to information.
- DHH children's vocabulary delays are due in part to their limited ability to overhear conversations around them and to parents and others using restricted vocabularies with them because of lowered expectations.
- Vocabulary instruction needs to occur in meaningful settings but will not develop sufficiently without direct instruction and extensive practice.
- Sign language vocabulary acquired before obtaining and using a cochlear implant

supports rather than impedes the acquisition of spoken vocabulary; the introduction of new words in sign as well as speech supports their acquisition in spoken form.

- To be effective for mathematical problem-solving, basic number concepts and skills need to be practised until they become automatic. DHH children may have fewer opportunities to practise these skills and often enter school behind their hearing peers in mathematical skills.
- Comparisons of the academic outcomes of separate and mainstream educational settings for DHH students are inherently invalid, because the children who attend them will be different.
- To provide appropriate support, teachers of DHH students must work closely with general education teachers and be knowledgeable about curriculum approaches used in general education classrooms.
- DHH children are more easily distracted visually in the classroom than hearing children.

Evidence-based best practices for educating deaf and hard-of-hearing children in Ireland: Recommendations and implications

The review provided in the *Best Practices* report led to recommendations that should provide DHH children in Ireland with greater opportunities to thrive academically and reach their full potential. Although the recommendations follow clearly from current knowledge with regard to the development and education of DHH children, neither those recommendations nor the EPSEN goals motivating them are likely to be attainable all at once. Progress will require collaborative efforts not only between government agencies but among all stakeholders. The report also noted that, because DHH children are considerably more diverse than hearing children, there is no single educational setting that will be optimal for all DHH children, nor, as noted earlier, has any particular model proved superior.

Recommendations fell into four categories: *early identification and intervention, language* (including cochlear implants), *educational models*, and *teaching and learning*. Others could be made, but there is clear evidence that these recommendations if implemented would have significant, measurable impact on the education of DHH children, with no potential to do harm either to the children or to educational or social structures. Below, each category is summarised and placed in the context of the present educational situation for DHH children in Ireland.

Early identification and intervention

Recommendation: There is no single aspect of raising and educating DHH children with as much positive evidence and international support as the importance of implementing universal newborn hearing screening (UNHS). Infants can be tested for hearing loss while still in the maternity hospital, efficiently, effectively, and at low cost. UNHS should be accompanied by comprehensive and objective early intervention programming that supports DHH children and their families. The education of parents is an essential component of such a programme, as parents' acceptance of children's hearing losses and their ability to make informed decisions are central aspects of any successful educational system for DHH children. In order for UNHS and early intervention in Ireland to succeed it will require an aggressive audiological programme that includes various options for the provision and fitting of hearing aids, cochlear implantation, and continuing support for technology, child development, and parent education.

Implications: The implementation of these recommendations will require perhaps unprecedented co-operation between the Department of Health and Children and the Department of Education and Science. This collaboration will need to include better training or restructuring of both the Visiting Teacher Service and special educational needs organisers as well as a national network of audiological, speech and language services. Ultimately, however, this collaboration will result in savings, both financially (in education, health and social services) and in human potential. In the long term these changes will feed back into the system by providing higher academic achievement, greater employment, and fewer demands on social services.

Language (including cochlear implants)

Recommendations: The report acknowledges that issues associated with language have been hotly debated in deaf education for centuries but noted that there is no evidence that one language modality or another is universally superior for DHH children. Neither does language acquisition in one modality interfere with the other. Although we are unable to predict which children will benefit most from spoken or signed language, the ultimate goal of an educational system should be the greatest level of achievement, independent of one's preferred mode of communication. The report suggested that in the context of early intervention during the first two or three years of life, children can be exposed to alternative modes of communication and their strengths and needs assessed.

Cochlear implantation is increasingly popular for children with profound hearing loss. It neither "makes deaf children into hearing children" nor "leaves deaf children stranded between deaf and hearing worlds." Most deaf children with cochlear implants function more like hard-of-hearing children than hearing children, which is still a significant advantage in educational settings as long as limitations are recognised. At the same time, many if not most children with implants acquire sign language at some point in their lives, and fears of the death of signed languages and the Deaf community because of cochlear implants appear to have been unfounded. Nonetheless, given the sensitivities associated with paediatric cochlear implantation, the report suggested that a gradually implemented and transparent programme might be most effective.

A programme of providing all DHH children and their families with the opportunity for instruction in Irish Sign Language (ISL) was also highly recommended. Providing parents with instruction in ISL would facilitate their involvement in their children's education, improve parent-child relationships, and ensure that children have consistency in language exposure. Parental support has been found to be perhaps the best predictor of language and literacy development among DHH children. Given some of the misunderstandings associated with ISL, it was suggested that a gradually implemented programme might be most effective.

The review indicated that, as intuitively appealing as bilingual (spoken and sign language) education might be, evidence with regard to its impact on academic achievement thus far is minimal. Nevertheless, a cautious approach to bilingual education was recommended, insofar as it does no harm and clearly does contribute to social-emotional and interpersonal growth.

Implications: The implementation of the preceding recommendations would require significant changes in the provision of services to DHH children and their families. The recommended cochlear implantation initiative would require a network of implant team services, working together and supporting each child over many years. Similarly, an expansion of sign-language instruction will require additional certified instructors as well as the utilisation of resources that may not be readily apparent (for example DHH SNAs and other members of the Deaf community as well as associated hearing individuals).

Providing DHH children with greater opportunities to acquire fluent language skills again will result in medium and long-term financial savings in the provision of educational, health and social services. The implementation of these recommendations will also go a long way towards satisfying the requirements of both the Education Act (1998) and the EPSEN Act (2004). More importantly, perhaps, they will allow DHH children in Ireland full access to the education they have been promised and to the social contract of rights and responsibilities.

Educational models

Recommendations: As described above, no single educational model has proved optimally effective for all DHH children, while the failures created by forcing children into inappropriate settings are all too evident. Available research clearly points to the need for an array of alternative educational settings, ranging from separate schools or programmes for the deaf to fully inclusive classrooms in which children can obtain all necessary support services while integrated with their hearing peers. Evidence from the literature and from within Ireland pointed to a mix of such settings as being most beneficial (“incremental

mainstreaming”), so that children can move into and out of various settings and discover those in which they are most likely to thrive.

Academic achievement requires age-appropriate instruction throughout the school years. It was recommended, therefore, that post-primary programmes for DHH students should be established within ordinary schools as well as within schools for the deaf. Because DHH students may have significant academic delays, those who need additional post-primary schooling beyond the age of eighteen should not have to leave schools that are serving their needs.

On the basis of existing evidence, the report suggested that for the purposes of both instruction and the larger educational system DHH individuals who are qualified or could be qualified to become teachers need to be encouraged and supported. Similarly, DHH and hearing SNAs with a background or experience in deaf education should be encouraged and supported both in their present positions, where they help to provide DHH students with access to the curriculum, and in the pursuit of higher education so as to obtain teaching credentials.

Implications: Pre-school programmes for DHH children were recommended in order to establish a bridge between the early intervention recommendations and those associated with education during the school years. These would offer opportunities for children and their parents to obtain support for hearing-related needs, assistive listening devices, sign language and special educational interventions until such time as the school takes over those responsibilities.

Consistent with both existing research and the insightful comments of DHH students in Ireland, the report suggested the need for more age-appropriate congregated settings, where DHH children would find social groups, gain the ability to collaborate on academic and other tasks, and develop stable and mature social identities. For these recommendations to succeed, however, more teachers of the deaf and more sign-language interpreters will be needed. In some cases, professional development for existing teachers may be sufficient or may provide a temporary solution to the shortage of

teachers. Some teachers have already engaged in professional development activities, either on their own or with mentors, in order to enhance their abilities to effectively educate DHH children. Those efforts should be supported and extended to other personnel who can help to facilitate students' access to the curriculum. At the same time, the report suggested a network of support services (for example sign-language interpreting, real-time text, tutoring) to support DHH students older than eighteen and to encourage them to participate in and support them while engaged in further and higher education.

Teaching and learning

Recommendations: Recommendations specifically associated with classroom instruction and students' learning overlap to some extent with those relevant to alternative educational models. The report indicated the need for encouragement and support for teacher training programmes and professional development for existing teachers in order to accommodate DHH students in a variety of educational settings. Research has demonstrated that those children have different knowledge, learning styles and problem-solving strategies from those of hearing children. Teachers need to know how their DHH students think and learn if they are to accommodate the students' needs and utilise their strengths.

Evidence from other countries indicates the long-term benefits of parents' contribution with regard to individual education plans (IEPs) both for children's education and for optimising relations between parents and schools. As indicated in the NCSE *Guidelines* (2006), "the key objective should be to maximise parental involvement and to make the experience for parents as positive and supportive as possible." IEP meetings should also include other professionals involved in a child's education (for example SNAs, SENOs, sign-language interpreters); deaf parents should be provided with appropriate support services so that they can fully participate.

DHH students require more support services in the classroom to allow them to gain access to the curriculum as fully as their hearing classmates. DHH students in Ireland also need to have high educational expectations placed on them by parents and educators. With high expectations and appropriate teaching and support services, those children can and will succeed.

Implications: The enhanced teaching and learning opportunities offered by these recommendations would require more audiological technology in classrooms in addition to specific educational technologies so that students can make use of their residual hearing. If existing teachers are to obtain access to professional development in order to help the DHH children to satisfy curriculum requirements, training activities will have to be made available. Opportunities (during the school year or summer, or both) and incentives to participate will also have to be created.

The recommendations with regard to IEP meetings may make them more complicated, but they will also be more effective. In addition to ensuring that the IEP is appropriate for each child, waste can be avoided, and parents will gain greater confidence in the educational system. Taken together, recommendations in this category will contribute to greater academic achievement, longer persistence, and a better-educated population. These in turn will feed back into educational and social structures, both financially and in optimising the utilisation of human potential.