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Monitoring the achievement of deaf pupils in Sweden and Scotland

Citation for published version:

Hendar, O & O'Neill, R 2016, 'Monitoring the achievement of deaf pupils in Sweden and Scotland: Approaches and outcomes', *Deafness & Education International*, vol. 18, no. 1, YDEI1142045, pp. 47-56.
<https://doi.org/10.1080/14643154.2016.1142045>

Digital Object Identifier (DOI):

[10.1080/14643154.2016.1142045](https://doi.org/10.1080/14643154.2016.1142045)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Deafness & Education International

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Monitoring the Achievement of Deaf Pupils in Sweden and Scotland: Approaches and Outcomes

Abstract

Over the past two decades there have been major developments in deaf education in many countries: medical and technical advances have made it possible for more deaf children to hear and speak successfully, and most deaf pupils learn in ordinary classes in mainstream schools. In this article we explore patterns of achievements of deaf pupils to see if these reforms have improved attainment outcomes. International surveys such as PISA do not include deaf pupils. This article describes two independent large-scale surveys about deaf pupils in Sweden and Scotland. The similar results from both countries show that deaf children, after two decades of social reform and technical advances, still lag behind their hearing peers. The results also show how large-scale surveys can contribute to a greater understanding of educational outcomes in a small, vulnerable group and make it possible to continue to reform the field to narrow the achievement gap further. The results further suggest that differing methods in two contrasting educational contexts can lead to some similar results and point to the need for different support to children with hearing loss and language disadvantages

Introduction

Aim

The aim of this article is to describe and compare two large-scale studies used which describe variation in educational outcomes between deaf and hearing children. The two projects, one in Sweden and one in Scotland, were conducted and devised independently.

Background

Education is of great importance for young people and their entrance into adult life. It can open up social mobility and can play a role in enhancing health and social cohesion (Causa & Johansson, 2010; Lindley & Machin, 2012; OECD, 2010, 2013). This might not, though, be true for all children with hearing loss (Helvik, Krokstad, & Tambs, 2013; Stam, Kostense, Festen, & Kramer, 2013; Woodcock & Pole, 2008). For that reason, there is a need for more exploratory research, overviews and evaluations to ensure high quality in deaf education. Our definition of deafness is any child with a hearing loss, whatever the degree, and irrespective of any form of technical support or language. In Sweden the inclusion criterion was having a hearing loss which was in need of rehabilitation; in Scotland a slightly wider group was studied, including children with temporary and intermittent deafness.

Deaf education

The aim of education is in general full participation in society and equal opportunities in life. In deaf education, irrespective of school placement, this is fulfilled by equity in accessibility to the curriculum, and by technical and communicative support.

There have been important developments in Europe over the last twenty years in the management and educational support of deaf children: Newborn Hearing Screening, a move towards mainstream placements (Pijl, 1997); cochlear implants for most profoundly deaf children (Archbold, 2010; Archbold & Mayer, 2012; De Raeve & Lichtert, 2012); exploration of sign bilingualism (Davies, 1991; Drasgow, 1993; Knoors & Marschark, 2012; Swanwick, 2010; Swanwick, Hendar, Dammeyer, Kristoffersen, Salter, & Simonsen, 2014); sign language recognition legislation (Wheatley & Pabsch, 2012) and changes in the education of and focus for specialist teachers of deaf children (Ahl & Nilsson, 2000; Beach & Bagley, 2013; Florian & Rouse, 2009; Heimdahl-Mattson & Malmgren-Hansen, 2009).

Deaf education as we understand it is an enterprise focusing on rights, quality and equity. There is a possibility for deaf pupils to participate in school when specific language support and access arrangements are in place.

School opportunities in deaf education vary a great deal because deaf children are a heterogeneous group with different educational needs. There are schools where sign language is used as a language in the classroom and sign language is a subject, so called special / deaf schools or bilingual schools. In Sweden these schools have a bilingual goal including spoken and written Swedish and Swedish Sign Language. There are resource bases where pupils get more support than can be offered in regular classes. Very often resource schools work closely to and with support from ordinary classes. They often use visual images in instruction and

blended languages, signs from sign language presented in the word order of spoken language, rather than sign language as a general option.

Irrespective of their placements in education, deaf pupils are narrowing the achievement gap with the wider pupil population (Rydberg, Gellerstedt & Danermark, 2009).

What disadvantages related to deafness or communication needs still remain a concern in education? Given the higher attainment level of some deaf students, more and better technical support, and fewer special schools in most developed countries, perhaps specific educational needs caused by deafness are declining.

To explore this issue we need data from regions and countries to give an overview of deaf pupils' achievements. There is a lack of these data and very few total population studies of deaf children. Our aim in this article is to contribute with large-scale data. We will describe two models which show how systematic monitoring of education can help pupils receive better support, regardless of needs. The two projects in Sweden and Scotland have looked independently at a large-scale research design for monitoring the achievements of deaf pupils.

Using large-scale methods

Thomas E Allen was early to establish and promote a large-scale methodology by describing demographic and social changes in the population of deaf and hard-of-hearing students (Allen, 1994). To evaluate changes in educational outcome and make planning easier he promoted the use of large-scale databases (Allen, 1994). In the wider educational research literature, different international organizations conduct and promote large-scale data sampling such as PISA (The Programme for International Student Assessment, OECD), PEARLS, (Progress in International Reading Literacy Study, IEA) and TIMSS, (Trends in International

Mathematics and Science Study, IEA). These are regularly referred to when national efforts are conducted to raise quality in education, (Bulle, 2011; Grek, 2009; Naumann, 2005).

Large-scale studies have been used not only for description but also as a tool to evaluate and change education. Grek, Lawn & Ozga describe international evaluation and comparison as a form of governance pressure on national educational policies and traditional governing (Grek et al., 2009). Sellar and Lingard take a more critical view, seeing OECD with PISA acting with a global governance function (Sellar & Lingard, 2013).

Even though different experiences from large scale studies have been described and discussed (Bulle, 2011; Grek et al 2009; Grek, 2009; Knodel, Martens, & Niemann, 2013; McGaw, 2004; Sellar & Lingard, 2013), using a large-scale methodology such as Allen suggested (Allen, 1994) has also led to other deaf education researchers following in his footsteps; see for example Convertino, Marschark, Sapere, Sarchet, & Zupan, 2009; Dammeyer, 2010; Luckner & Bowen, 2010; Qi & Mitchell, 2012. However, these studies do not report on such large cohorts as Grek reported PISA as having (Grek, 2009).

The experience with PISA, TIMMS and PEARLS show how they entirely exclude pupils with disabilities (Schuelka, 2013). There have been attempts to provide an overview of deaf learners' educational performance, but they have in many cases failed due to the range of research methods and complicated patterns of findings (Thoutenhoofd, 2010). We find it important for equity reasons, therefore, to explore and continue the methodology of large-scale studies in deaf education.

Large-scale studies make it possible to track deaf pupils' achievements and demonstrate a complementary statistical power compared with smaller-scale studies. With

knowledge of variation within and between groups, it may become easier to understand diversity and plan individual and group based support.

Sweden and Scotland

In both Sweden and Scotland, as in many other countries, deaf education has changed according to reforms in the educational and linguistic domains. Possibilities for inclusive education and sign language tuition have had an impact on views of what is the norm for school placement.

Deaf pupils in Sweden have the right to choose any school. Attendance at special school and schools for hard of hearing and deaf children are regulated by needs. Some deaf pupils (15% of the deaf pupil population) attend a special school which follow a sign bilingual approach. Others (14%) attend schools for hard of hearing and deaf pupils. Most pupils attend mainstream schools (71%), (Hendar, 2008). The experience in Sweden shows that pupils with severe and profound deafness prefer sign bilingual schools. Pupils with moderate to severe hearing losses attend schools for hard of hearing and deaf children, and pupils with mild to moderate hearing loss choose mainstream placements (Hendar, 2008).

In comparison, deaf pupils in Scotland may, depending on need – level of hearing loss, communication or additional disability- attend a special school, which includes schools for deaf children (10%), or they may attend a resourced mainstream school which has high levels of support available for deaf children (6%); the remainder attend their local mainstream school (84%) (Weedon, Ahlgren, Riddell & Sugden, 2012).

The possibility of having sign language tuition and support in mainstream schools is an option but the service offered varies a great deal from school to school in both countries.

In both Sweden and Scotland there have been longstanding concerns of under-achievement of deaf children, (Bagga-Gupta, 2002; Brennan, 2003). This persistently low attainment has also been described by others (Conrad, 1977; Holt, 1993; Powers, 1999; Easterbrooks, 1999; Traxler, 2000; Marschark, Spencer, Adams, & Sapere, 2011). Bearing that in mind, the focus of this article is to explore ways of researching deaf children's attainment levels at a whole country level.

Neither Scotland nor Sweden had any annual reporting of achievement covering all deaf pupils. National educational databases do not cover all deaf pupils. The Scottish Government did collect information about deaf pupils who had a Record of Needs or an Individualised Educational Programme during the period studied by the Achievement of Deaf Pupils in Scotland research team, but this was far fewer deaf pupils than the number actually supported by local authorities. Since the Consortium of Research into Deaf Education (CRIDE) started reporting the countries of the UK in 2011, there is still a gap between central government statistics and the numbers of deaf pupils local authorities say they support.

The reason why hearing level is not mentioned in national statistics is based on ethical considerations according to disability policies and that the severely and profoundly deaf group only represents approximate 1-3/1,000 in education (Hendar, 2008; Stevens et al., 2008; Vartiainen, Kempainen, & Karjalainen, 1997; Fortnum, Marshall, & Summerfield, 2002). In Sweden statistics on attainment for pupils with severe and profound deafness in special

schools have been published annually (Hendar, 2008) but not on pupils with hearing loss in mainstream schools.

When reporting on underachievement among normally hearing pupils the literature normally describes gender, migration, and socioeconomic status as factors associated with achievement (Convertino et al., 2009; Kluwin, 1994; Shaver, Marschark, Newman, & Marder, 2014; Stacey, Fortnum, Barton, & Summerfield, 2006). Other causes are mentioned but they are often expressed in general terms such as additional disability or in need of special education. We expected a great variability within the deaf pupil group and for that reason wanted to explore a model to describe different factors. As the population of deaf pupils in education is low we wanted to use a country-wide and large-scale method, minimizing the risk for identifying individual cases.

Research questions

Many educational reforms have had an impact on deaf children and therefore there is, as we found, a need for follow up studies to ensure reforms reach their equity and equality targets. Also advances in technology, legislation about sign language and changes in teacher education have taken place during the last decades. Many reforms cannot be evaluated properly in relation to deaf pupils without national statistics. Teacher education, sign language legislation and governmental grants in education are examples of reforms that normally are dependent on national statistics. Thus we wanted to explore the consequences of deafness on educational attainment, given the variation of support offered such as specialist teachers of deaf children, hearing aids and the provision of sign language.

The research questions for the Scottish study were: How do the academic, social, and vocational outcomes for deaf children compare to those in the wider population of children /

school leavers in Scotland? What patterns of intervention, support, and educational methods lead to the most successful outcomes for deaf children? (O'Neill, Arendt and Marschark, 2014). The aim and question in the Swedish study was to report and analyse any differences in goal fulfilment between pupils at special schools (which in Sweden are schools just for deaf children) in comparison with deaf pupils in mainstream schools. The question was if there were any differences in achievement between alternative school placements. The Swedish project was undertaken on behalf of the Ministry of Education as a project at The Agency of Special Schools.

Method

To monitor deaf education in a national perspective a large-scale cohort cross-sectional design (Shaughnessy, 1994) was used in Sweden and a longitudinal design in Scotland. Both countries collected achievement information on the cohort and used survey instruments to receive information from parents and teachers.

Both studies used data-sharing agreements with national statistical agencies to check achievement scores. In Scotland records of exam results from the Scottish Quality Authority (SQA) were matched with pupils to give a tariff score. In Sweden final exam merit grades were used to provide a similar tariff score. In both studies comparisons were made with national scores, and the effects of socio-economic status, gender and additional disability were explored.

To describe socio-economic status in Scotland a measurement of data zone deprivation was used and in Sweden information of parental education level was collected. Both measurements are commonly used in education and come from official national statistics.

Participants

The degree of hearing loss, deafness, appears in the literature to be crucial for interpretation of outcome, see e.g. (Järvelin, Mäki-Torkko, Sorri, & Rantakallio, 1997; Moeller, 2000; Powers, 1998). In the studies presented in this article classification of deafness adopted was targeting a broad representation of different levels of hearing loss and therefore we used both audiological thresholds in medical records and parental and teachers' descriptions.

The Scottish study included any deaf child who received at least two visits from a teacher of deaf children each year (O'Neill et al., 2014). In Scotland data were collected from teachers and parents, not audiology clinics. The Scottish study limited its focus to 540 deaf children for whom there was a match between the Achievements of Deaf Pupils in Scotland and official data on exact year group.

The Swedish study received identity information from audiology clinics on children with at least mild deafness without any more specific information of hearing loss level, aid or additional disability. To get data on variables, the study used information received from parents and teachers in a functional assessment survey describing the children's hearing level together with other background data (Hendar, 2008). Briefly, cases were identified in audiology clinics and transferred to Statistics of Sweden, (SCB), and the survey was administered within their systems. SCB connected cases with attainment data and sent out surveys to parents and teachers. The project group received anonymous data to be elaborated

and analysed in Excel and SPSS (IBM). This design has later been fully and partly used in Norway in two independent studies (Hendar, 2012; Rekkedal, 2013).

By collecting data from hearing centres in Sweden and information from teachers in Scotland a cohort was defined and found. In Table 1 below the data in Scotland (1,607) were those originally from the ADPS 2000-2005 database (Achievements of Deaf Pupils in Scotland project, 2000-2005) that had reached an age of 16 where achievement in national examinations were expected. To ensure the accuracy and quality of data, records were confirmed in both ScotXed¹ and SQA² files. In order to match records between agencies the number of excluded cases was surprisingly high (1,067 cases). In Sweden, on the other hand, data from hearing centres reached a higher quality and therefore exclusion of data was low (31 cases).

At age 16 in Sweden pupils receive final merit scores (marks) from secondary school. Scottish data were collected on school pupils who reached at least the fourth year level of secondary school, age 15-16.

Table 1

Procedure

After formal approval, Hearing centres in Sweden sent records of school age pupils to the Swedish statistics agency, Statistics Sweden (SCB). SCB collected attainment data from

their own registers. The response rates were very high: initially all hearing centres responded and sent records to SCB.

The Scottish study reported here is a follow-up study using data from the earlier database established in Scotland between 2000 and 2005, the ADPS where teachers completed a paper questionnaire about each deaf pupil, achieving a response rate averaging 96% over the period 2000-04 (Grimes et al, 2007). By using statistics from the SQA it was possible to identify individuals and receive data on educational achievement.

Data used

In Scotland the school leavers' score in the fourth year of secondary school, S4, was used. These were based on the Scottish Credit Qualification Framework, SCQF (for further reading see www.scqf.org.uk/framework-diagram/Framework.htm). Based on the SCQF scale, the score of results from public examinations up to and including the fourth year of secondary school (year S4, aged 16), was calculated for each pupil. In Sweden final marks and merit scores were collected. Entrance to further studies on national courses was at the time given to students with marks in English, Maths and Swedish in addition to other merit scores to enter in to courses in competition with other students. Data from both Sweden and Scotland were analysed in SPSS.

Results

Both Sweden and Scotland confirmed a lower attainment level for deaf pupils based on arithmetic means (Hendar, 2008; O'Neill et al, 2014). Hearing loss, in general, increases the risk for lower attainment at the end of compulsory education.

The two projects have each presented final reports (Hendar, 2008; O'Neill et al., 2014). To answer the question if there is a need to monitor the educational attainment of deaf pupils on a country level we have chosen to present data on four themes: Qualifications for higher education; Distribution of high and low results; Bimodal distribution and Effect of additional disability.

Deaf pupils have difficulties in reaching all goals in education. The outcome of attainment results from our studies confirm those in other studies (Helvik, Krokstad, & Tambs, 2013; Stam, Kostense, Festen, & Kramer, 2013; Woodcock & Pole, 2008).

Qualifying for higher education

Deaf pupils attending a school for deaf children in Sweden have only a 38% chance of qualifying for upper secondary school, compared to 65% of children at schools for hard of hearing pupils and 78% of deaf children placed individually in mainstream schools. As mentioned before, there are differences between these groups in terms of hearing loss level and additional disability, which can explain part of the variation. Qualifying for upper secondary school in Sweden at the time was based on at least a pass level of attainment with merit grades in three subjects: Mathematics, English and Swedish. Deaf children born abroad and moving to Sweden have a wider range of merit scores in all subjects, and boys have lower levels of achievement. The expected qualifying level for upper secondary school for hearing children, was at the time in Sweden above 90% (Skolverket, 2006).

In Scotland 77 per cent of all pupils gained five or more awards at level 4 SCQF or better at the end of their 4th year of secondary school, compared to 61 per cent of deaf pupils. This means that a significantly smaller proportion of deaf children will qualify for higher

exam courses, and the consequence is that more move on to college rather than university (Fordyce et al, 2013). In Scottish colleges a very broad range of students is accepted and there are routes through to Higher Education entry, such as the 2-year Higher National Diploma (HND), which takes students to year 2 or 3 of a degree at a university later. Statistics of employability on graduation show that rates are lower for the new universities, and it is these universities which take students with HNDs from Further Education colleges (Higher Education Statistics Agency, 2012).

Distribution of high and low results

Pupils with a hearing loss are at risk not to achieve the same attainment level as other pupils. In Figure 1 we compare the outcome of English language as a subject for 482 deaf pupils in Scotland with the average tariff scores from National data for 16-year old school leavers, by the highest SCQF level. The SCQF level is a standard way of reporting results across the education system in Scotland. The results here are grouped by tariff scores of 3 and below, level 4 and level 5 and above. Level 3 skills in reading show an ability to read a text on a familiar topic, whereas at level 5 candidates display skills in reading a text from a different cultural or historical context, showing a wider range of awareness about the writer's craft and the impact on the audience.

Figure 1

Figure 1. Proportion (%) English SCQF score compared with Scottish average tariff score 2009/2010. The proportion in black is for deaf pupils 22%; and for hearing pupils 11%.

The distribution of proportion outcomes have been analysed with a Chi-square test, $\chi^2=14.86$ (2), $p<0.01$. This result indicates a significant distributional difference between the two groups. Data from Scotland shows a higher frequency of level 3 and below and a lower frequency of level 5 and above.

The results from the Swedish data (see Figure 2 below) were similar to the results in Scotland. The figures confirm international studies expressing a variation within and between deaf and hearing children (Conrad, 1977; Powers, 1998; Stacey et al., 2006; Tymms, Brien, Merrell, Collins, & Jones, 2003).

Bimodal distribution

At the time in Sweden one definition of expected goal fulfilment was that young pupils should reach at least Pass in each subject (the grades awarded are: not Passed, Passed, Passed with distinction and Passed with special distinction). The measurement used in Figure 2 is based on the summary of these grades. A Pass gave them 10 points, Pass with distinction – 15 points and Pass with special distinction – 20 points. This gave a range from 0 to 320 points. National comparisons were built up by national statistics on averages from each school. In 2006 the average of national scores was 210.

Figure 2 below shows the outcomes from two Swedish educational placements: special schools and mainstream schools. The deaf pupils in mainstream settings are more often mildly or moderately deaf with a lower incidence of additional disability (Hendar, 2008). In special schools, on the other hand, it is more common to find pupils having a severe and profound

hearing loss and the frequency of additional disability is higher (Hendar, 2008). The results of the final exam merit scores suggest that pupils with mild and moderate hearing loss in mainstream schools compared with severely and profoundly deaf pupils in special school have the same pattern of achievement as the all Sweden group. For both groups of deaf children there are fewer pupils with merit scores above 210 (above average) and more pupils with merit scores below 150 (low scores).

Figure 2

Figure 2. Proportion (%) of final merit score in two school placements compared with national data, 2006, in Sweden

In the above distribution of final merit rating scores there is a double-peak curve i.e. a bimodal distribution. This bimodal distribution in sign language education, i.e. in a special school, has been reported in other studies on the same target group of profoundly deaf pupils. Haug found a similar distribution in an evaluation of a German Sign Language Test (Haug, 2011, p. 323). A higher frequency of additional disability could be an explanation of this bimodal curve. The results suggest the need to take into account the presence of additional disability, 40% (Hendar, 2008), in Swedish deaf schools when evaluating educational outcomes.

Effect of additional disability

Additional disability was possible to identify in the Scottish study and confirmed earlier findings that deaf pupils with an additional disability score lower and very much lower compared to deaf pupils without an additional disability. Table 2 shows the outcomes from Scotland.

Table 2

Findings in Scotland, Table 2, and results from the Swedish study suggest that a combination of additional disability and degree of hearing loss has a larger effect on educational outcomes rather than different school placement or choice of language.

Conclusion

We have described two independent large-scale surveys covering deaf education in Sweden and Scotland. The similar results from both countries show that after two decades of social reforms and technical advances there are still many challenges. The results show how large-scale surveys can contribute to an expanded understanding of educational outcome in a low incidence group and make it possible to follow up reforms and support small-group research and qualitative studies.

Discussion

Deaf pupils are under-represented amongst the high scoring group and over-represented in the low scoring group at the end of secondary education in both countries. This suggests that the measures currently in place to support deaf learners need further investigation and research. In both Sweden and Scotland the research teams wanted to use the results of the research to assist practitioners in making decisions about teaching and resources

for deaf children. Both groups wanted to explore the possibility of collecting achievement information from a large group of deaf school leavers. By referring to both datasets we found that it is possible to compare countries in relation to deaf learners and nationally expected levels of attainment. There was similar variation and attainment gap in relation to deaf children's school attainment in both countries. In the future this comparison may help us discover how large-scale studies can be used in order to enhance development of support to deaf pupils.

Possible reasons for the achievement gap

There are many factors explaining lower achievement levels of deaf children. These have been attributed in the literature to late diagnosis, failure to establish a fluent first language in the early years, lack of access to the curriculum, having an additional impairment and possibly having teachers or support workers who don't have the correct skills or experience (Marschark et al., 2011). Powers argues in his analysis of what causes success that support from parents is the crucial factor in the success of deaf young people, but that parents are not always aware of their critical role (Powers, 2011). Many of these variables are not easy to follow over time if groups in studies become too small. By using a large-scale methodology we tried to minimise this risk and make it possible to follow changes over time. Therefore we would propose more research, especially on early language acquisition and parents' critical role.

Final remarks

The overall question, whether large-scale studies can be used in school systems to get information and a picture of deaf education, was clearly confirmed in both countries. The consequence of low attainment seems to delay deaf young people in both countries. And even

if there are alternatives, the outcomes of education describe a high risk for inequality for pupils with hearing loss. These results from our findings can be used as a baseline for follow-up studies and can inspire reforms in education to ensure more rights, equality and equity in deaf education. This work in Scotland and Sweden has the potential to fill a gap in planning for and understanding more about the diverse needs of deaf children. In Scotland the reporting of this wider group of deaf pupils in the ADPS study has perhaps contributed to the Government extending its data collection through the annual pupil census; now 22.5% of all pupils are listed as having a particular additional support needs in attainment data (in Scotland this category includes children for whom English is an additional language and pupils experiencing interruptions in their education, Scottish Government, 2015). There could still be improvement in recording pupils who are affected by more than one issue or impairment, and pre school children supported. Similarly the CRIDE survey across all countries in the UK has requested heads of local authority services to make returns on all supported deaf pupils and staff each year from 2011 (CRIDE, 2015). Concurrently the English Government has improved its data collection where both primary and secondary impairments are recorded, though only the first is reported on, and pre-school children are also still unrecorded (Department for Education, 2015). The Education and Culture Committee of the Scottish Parliament has recently responded to the Scottish research described here (O'Neill et al., 2014) and suggested that improvements need to be made to the monitoring of attainment of deaf pupils in Scotland (Scottish Parliament, 2015).

The next steps for both researchers are to take details of the study to teachers, parents and d/Deaf communities in Sweden and Scotland. Teachers may be able to use the results to assist with allocating levels of support. For example in Scotland as there is no statistical difference in the educational outcomes by particular levels of deafness, there could be an

argument that mildly and moderately deaf pupils should be supported more effectively. Among several options one way would be by improving support for all children in the environment e.g. better classroom acoustics, and making deaf awareness for teachers more rigorous. Parents of children in mainstream schools in Scotland will perhaps be surprised at the lack of policy advice in Scotland about acoustic treatment of school buildings compared to Swedish standard (Wennergren, 2008; Scottish Parliament, 2015). But the relatively poor results of mainstreamed hard of hearing children in Sweden could suggest that a peripatetic specialist qualified teaching force might be useful. Practitioners from the two countries, therefore, could work together more closely to compare provision for deaf children.

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Endnotes

¹ ScotXed Unit is part of Education Analytical Services division within the Learning Directorate of the Scottish Government

² SQA is the national accreditation and awarding body in Scotland