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The views and experiences of deaf young people and their parents using assistive devices at home before and during the COVID-19 pandemic

Brian Shannan
Rachel O'Neill
University of Edinburgh

January 2022



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Executive Summary

The NDCS commissioned Rachel O'Neill and Brian Shannan to conduct qualitative research into the experiences of families using assistive devices in the home. Qualitative, semi-structured interviews were conducted with each of the eleven families to gather their views and experiences of their deaf child their assistive device at home, during social activities and online learning because of the COVID 19 pandemic. Three professionals were also interviewed using a similar format. All participants and professionals completed consent forms and the research was approved by the ethics committee at the University of Edinburgh.

From the interviews the following themes were identified:

- Assistive devices were under-utilised which was due in part to a lack of awareness of the different features of the device and lack of training.
- Families were not able to experience seamless and continuous support when there were faults and issues with their assistive devices.
- There is little competition in the market with a single manufacturer dominating market. Cost of equipment remains expensive.
- Online learning provided many challenges to deaf learners and subtitles were not routinely available.
- There was a reduction in the amount of teacher of deaf support for families during the lockdown period.

The study found that most deaf young people made use the assistive technology in and outside of school. However, many of the participants reported that the systems were being inappropriately used in schools which led to disengagement or user dissatisfaction during some specific lessons or learning contexts. Lack of awareness of many of the features of the assistive devices, such as connectivity to laptops, tablets and televisions meant that young deaf people were not always able to achieve appropriate access to learning and communication.

NHS and education adopt a two-track approach to assistive devices. The view is that NHS have responsibilities for hearing aids and assistive devices are the responsibility of education. Families want to go to an audiology appointment and have all matters related

to hearing technology addressed at a single point of contact. To improve family satisfaction, the key stakeholders should focus less on ownership of the equipment and instead focus on the joint ownership of a solution.

Most of the parents appreciated the benefits of the assistive device at home and school. The most popular use of the system was at after school clubs or activities that occurred in outside spaces. However, only a single manufacturer's system was used by all the participants, and this reflects a market with little competition. Costs of the systems remain high, and this limits local authorities from making systems more widely available.

During lockdown many families reported limited input from teachers of the deaf. Online learning was difficult to access due to poor management of the virtual classroom and by the paucity of subtitles. Schools do not routinely focus on the needs of pupils who are deaf or experience listening difficulties in conception, delivery, and evaluation. To be more equitable, Scottish education needs to ensure that key figures (Education Scotland, local authorities, school leaders and Local Authority services for deaf children) have subtitles as a standard requirement for any online learning or teaching materials.

The families and young people also provided suggestions for any future lockdown.

Key recommendations

- A central bank of training materials for parents, deaf young people and teachers should be created demonstrating common uses and good practice for using assistive devices. This could be available on the Scottish Sensory Centre (SSC) website.
- Better joint working is needed between NHS paediatric audiology services and education services for deaf children. Families should be able to access a single point of contact for support.
- Assistive devices should be available to purchase through the national procurement programme. The collective approach to purchasing should help to reduce costs.
- Education Scotland and the Scottish Government should set a standard for the use of subtitles in schools. How Good is Our School should incorporate this into

standard 1.5 Management of Resources to Promote Equity. This would ensure that schools evaluate their provision of subtitled resources as part of the self-assessment cycle.

- Education Scotland should provide guidance to schools on promoting an inclusive online environment to ensure that deaf learners have equitable access to education.

This research was funded by the National Deaf Children's Society. Thanks to the families and professionals who contributed from across Scotland.

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1 Background

1.1 Description of Underlying Issue

Listening to spoken communication in an enclosed space generally occurs in an imperfect environment, one in which there are multiple competing voices, long reverberation times and interference from various noise sources. Personal factors such as age, social background, language levels, cognitive ability, past and current experiences all influence how listening is experienced by an individual (Shannan, 2020).

Plomp (1978) characterised deafness as both attenuation and distortion of speech. Attenuation, a reduction in the level of speech and noise, manifests itself as difficulty in accessing speech in a quiet environment. Distortion, a reduction in speech levels relative to noise, manifests itself as a difficulty in accessing speech in a noisy environment. Personal factors such as the degree, type and configuration of deafness and whether the deafness was congenital or acquired all influence how accessible speech is to the individual deaf young person.

When the government introduced national restrictions in response to the global Covid-19 pandemic, the internet became a medium for both social interaction and learning. Barak and Sadovsky (2008) compared the motivation and type of internet use of deaf and hearing adolescents and found that on average, deaf young people (age 12-15 and 16-19) used the internet more intensively than their hearing counterparts. The deaf young people used the internet for both personal and group communication.

However, the speed at which the restrictions were imposed in the Covid-19 pandemic left many local authorities unprepared. An NDCS (2020a) survey found that of sixteen local authorities that responded, only ten had two-way communication in place. Furthermore, due to the divergence in local policy, not all deaf learners were able to have access to their assistive devices at home during the lockdown period. An online NDCS survey aimed at deaf young people (Wright et al., 2021) found that 60% of the 135 deaf children and young people reported worse mental health during the lockdown periods.

1.2 Current intervention options

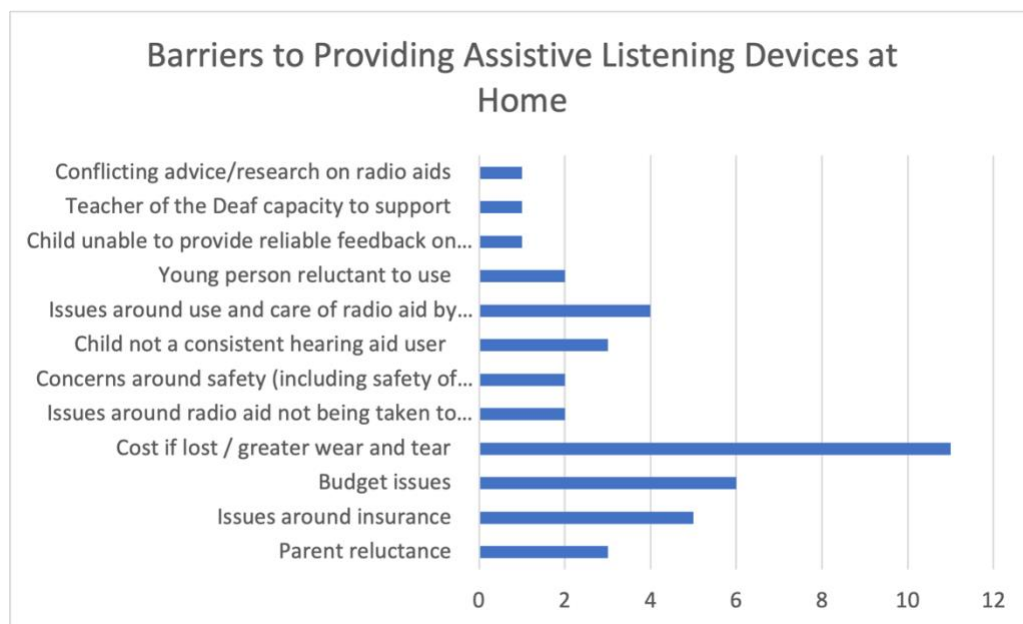
For young people fitted with hearing aids, the most common intervention to mitigate the detrimental effects of distance and poor acoustics is an assistive listening device. An assistive listening device is sometimes referred to as an FM system. FM is an acronym of Frequency Modulation and relates to technology that previously operated on the 173-175 MHz band. With the introduction of digital technology that operates on 2.4 GHz, the term FM is anachronistic and so assistive listening device will be used throughout this report.

There are two basic types of assistive listening device: personal body worn and behind the ear. Both systems are composed of a transmitter and receiver. The transmitter is either worn by the main speaker or placed on a flat surface to detect multiple speakers during group activities. The receiver is connected wirelessly to the transmitter and requires connecting to a hearing aid that has been programmed to detect the system.

1.3 Local Authority Provision

It is generally the responsibility of the 32 local education authorities in Scotland to provide assistive listening devices. The NHS provides the hearing aid or cochlear implant. Around 33 per cent of local authorities currently provide assistive listening devices to pre-school young people (CRIDE, 2018). Twenty-one (66%) of Scotland's local authorities allow for the use of an assistive listening device within the home. As Table 1 illustrates, the main reason for not providing a system in the home was the cost if the system was lost or had increased wear and tear (NDCS, 2020b).

Figure 1: Main reasons for local authorities not providing an assistive device for home use (Number of LAs which responded = 30)



Source NDCS 2020b

1.4 Evaluating the benefits of an assistive listening device

The two main methods used to measure the effectiveness of an assistive listening device are speech recognition tests in noise or questionnaires. Speech intelligibility can be measured by calculating the number of phonemes, words and/or sentences correctly identified. There are two main types of speech assessment: open and closed. Examples of closed speech tests are Manchester Picture and CHEAR tests; open tests include the Manchester Junior Word List, BKB sentence test (see Listening Skills, NDCS website 2021).

Questionnaires have been used to assess young people's listening performance in a range of contexts. The questionnaires have been used to measure early years auditory and communication development with parents: LittleEARS, PEACH (Phonak website, 2021), Success from the Start (NDCS 2020); with teachers: TEACH, CHAPS (Phonak, 2017), and with students (LIFE: York Hospitals, 2003). Responses are recorded using different types of rating scales.

There is a paucity of qualitative research examining the experience of young people's assistive listening device use in online and community settings. This study will provide an insight into the experiences of families and young people of using technology during the Covid 19 pandemic.

2 Aims

This study aims to:

- Explore the views and experiences of parents, deaf young people and professionals on the benefits and challenges of assistive listening device use at home and in the community before and during the Covid-19 pandemic
- Explore the views of parents and deaf young people on the effectiveness of the assistive listening device system in online learning contexts.

3 Methodology

3.1 Research design

The study used an exploratory qualitative design. Using existing listening questionnaires (LIFE, PEACH etc.) was not appropriate as normative scale scores do not allow for nuanced responses and for key themes to be developed (Theofanidis and Fountouki, 2018). Eleven families of deaf young people completed a semi-structured interview via Zoom. In some cases, the deaf young person was present and joined in with their parents. The interview schedule explored the circumstances in which assistive listening devices were made available to use at home, the training provided and how they perceived the benefits and challenges of using the system (see Appendix 1 for the interview schedule). Three professionals working with deaf children and families were also interviewed (see Appendix 1 for separate interview schedule).

The study received ethical approval from the University of Edinburgh Moray House School of Education and Sport. Participants received an information sheet and all signed a consent form. This information can be viewed on the project website at the Scottish Sensory Centre (2021).

3.2 Participants

For the purposes of the study the term participant is used to refer to the family members who were interviewed. This refers to an individual parent or an interview with the young person present. The inclusion criteria for participants included:

- Families must be able to give consent.
- Young people over 12 years old were asked to provide informed consent.
- The deaf child or young person must have had access to an assistive listening device at home during the last 24 months.

The parent participants were recruited through the Heads of Service forum, linking with professionals from the different local authorities and from a website set up via the Scottish Sensory Centre. Requests were also made through the Deaf-Ed mailing list at the Scottish Sensory Centre, through NHS contacts and through the Deaf Education Matters Scotland Facebook Group. Three professionals were interviewed about their perspectives on the use of assistive devices during the Covid-19 pandemic. We wanted to explore professionals' perspectives on parents' views and their own views on the impact of the COVID-19 pandemic in relation to assistive device use.

3.3 Data Collection

Semi-structured interviews via Zoom or Teams were completed by the two authors, an educational audiologist and a senior lecturer in deaf education. At the start of the interview, participants were reminded that they could withdraw or conclude the interview at any time. The same format was used in each interview which was recorded on Zoom or Teams and a transcript produced. This was then edited, and errors amended soon after the interview was complete. At the end of each interview, participants were reminded about how their data would be used. Field notes were kept by the interviewers to start the analysis process.

3.4 Data analysis

All Zoom or Team recordings were transcribed in full. Thematic content analysis was carried out using NVivo 1.5. Codes were generated and during this process some codes were collapsed into others that were capturing a similar theme. The researchers jointly coded one interview, then coded the remaining interviews, checking a sample of each others' work. The field notes were used as a way of providing initial thoughts on the attitudes and contribution of participants. The resulting themes are presented here in eight sections with representative quotations illustrating these themes from parents and professionals. The participants who put forward these points of view have not been identified in detail to preserve their anonymity and pseudonyms are used in this report.

4 Results and discussion

4.1 Characteristics of the Participants

As Table 1 illustrates, the 11 deaf children and young people were educated in six of Scotland's local authorities. Only twenty-one local authorities allow assistive devices to be used at home and so the sample represents 28.6% of the eligible local authorities (NDCS, 2020b).

Most of the children attended mainstream provision with only one deaf student attending a secondary Resourced Base. The children were educated at the nursery (n=1), primary (N=6) and secondary (N=4) stages. The participants were from 11 families and were made up of 9 mothers, 4 fathers and 3 deaf children. There was a reasonable spread of socio-economic status represented as measured by the Scottish Index of Multiple Deprivation (SIMD): 6 were from families in deciles 1 – 6 representing the most deprived areas of Scotland, and 5 were from deciles 7 – 10, that is families in the least deprived neighbourhoods.

Table 1: Demographic data of participants

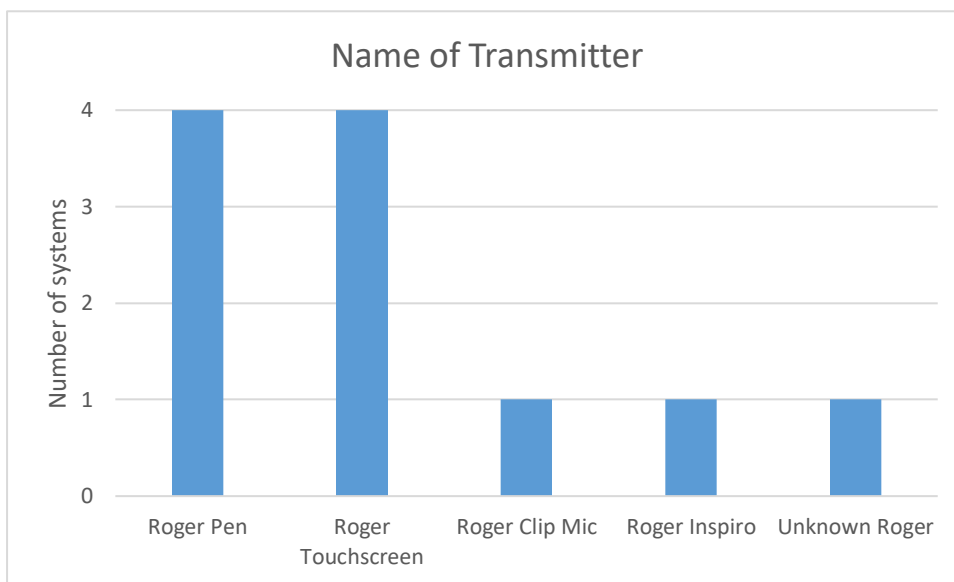
Family	Participants in the interview	Deaf child's Age	Deaf child's Sex	Deaf child's Hearing Aid	Deaf child's Educational Placement	Region	Household SIMD Decile
1	Mother and child	12	F	2 x BTE	Mainstream	Fife	4
2	father	2 ½	F	2 x BTE	Nursery	Fife	2
3	mother, father and child	13	F	2 x CI	Resourced Base	Fife	2
4	mother	8	M	2 x BTE	Mainstream	Fife	10
5	mother	10	M	2 x BTE	Mainstream	Renfrewshire	9
6	mother and child	11	F	2 x BTE	Mainstream	Lothian	10
7	mother and father	9	F	2 x BTE	Mainstream	Renfrewshire	4
8	mother	9	F	2 x BTE	Mainstream	Ayrshire	10
9	father	14	F	2 x BTE	Mainstream	Stirling	8
10	mother	10	M	2 X BTE	Mainstream	Edinburgh	6
11	mother	11	M	1 x BTE	Mainstream	Ayrshire	3
Professional							
	Work role					Employer	
1	Chief Paediatric Audiologist					NHS	
2	Educational Audiologist					Several local authorities	
3	Youth Outreach worker					Third sector organisation	

4.2 Assistive listening devices

All the assistive devices were supplied by Phonak. The different types of transmitters used by the participants are illustrated in Figure 2. One family had to purchase their own assistive device when they were refused home use by their local authority. Interestingly, the local authority then asked if the privately funded system could be used in school. Understandably, this was refused by the family.

All other systems were provided by the local authority. One family was provided a system by their local authority but were also provided a system through a grant by the Scout Association.

Figure 2: Main transmitters used by participants (Number of families = 11)



Many families referred to the cost of the equipment and their concerns if it was lost. They were given old equipment, only to be used in school.

And then the second time (lockdown) they give us like a pen. It was a new one and they said this is very expensive. And they talk about all this (both chuckle). And then, you know, they took this from us. They said we can't afford it. Because some people I think they need this more than Kamal. They give it to us the old one. Yeah but in school. Not in my home. The teacher she has to use the radio aid for Kamal.

One participant, one of the professionals, complained that the market was a monopoly, and this penalised young people who transitioned into adult services, tertiary education, or work:

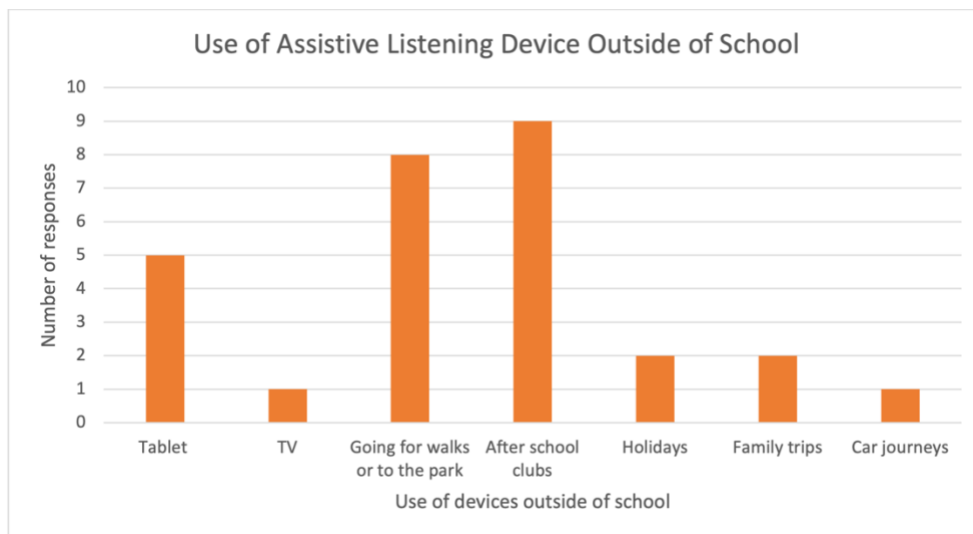
That is my great fear young people are getting used to good hearing in school but when they become an adult, they might no longer be able to afford it. Access to Work will not cover the cost of repairs and what you find is that there is a flat cost for any repair, and this costs more than the kit.

Another professional, observed that other hearing aid manufacturers needed to compete in the assistive device market to provide better choice.

4.3 Common usage outside of school

As Figure 3 illustrates, the assistive listening devices were most commonly used in outdoor activities or after school clubs. This is unsurprising as in outside spaces there are fewer surfaces for direct sound to reflect off and so the intensity of the sound diminishes the further you are from the source. This is referred to as the inverse square law (Gelfand, 2016). Families reported that their children attended horse riding, hockey, and football. Nine families provided examples of when the system was used outside of school. In some cases, more than one answer was given.

Figure 3: Common usage of the assistive listening devices outside of school



Many of the indoor after school clubs occur in halls or venues that have suboptimal acoustic conditions for speech. Therefore, it is not surprising that families and young people valued the improved signal to harmful noise ratio provided by the assistive listening device. Scouts, dancing, and gymnastics were activities that the assistive listening devices were regularly used.

He takes it to the tennis, he takes it to the cubs. He has it in the theatre group this week, he will take it to whatever he is going to do in summer but as for when we go on holidays ... it doesn't sound like much but I just don't have the energy to remember something else. And he is now getting to that age where he is a bit embarrassed about it.With the FM system I know he can function in a group setting. So ... it means he can join the clubs and he can join the hobbies and he can hear what is being said and what he has to do.

A hearing aid's microphone is effective for direct speech at a maximum distance of two metres, but this depends on the acoustic conditions and levels of background noise (Dillon, 2001, American Speech-Language-Hearing Association, 2002). When going for walks and trips, or visiting the park, the parents were often outwith this zone, so accessing direct speech was challenging. When parents reported the use of the assistive listening device in these scenarios, they not only referred to improved speech perception but also the confidence they felt from a safety perspective. This was whether it was in a crowded place, football stadium or walking along a busy road.

It got taken off us when schools broke up for the summer. I've used it from mebbe two or three hundred metres? In the park. She's in the park and runs across a big main field. You can shout to her. Well not shout. I was actually amazed how it works. Through speaking through the mic attached to my top. And she turned around instantly because she could hear you, rather than hearing everything else. I think it's actually quite amazing because I can plug it into my sound bar or her Kindle when she's playing with Waffle the Dog or the rest there, and she can tune into that rather than when, the washing machine's on and that.

Similarly, the home environment provides a complex listening environment where an assistive listening device would be beneficial. However, as Figure 3 illustrates, the use of the device was surprisingly low. Although four families used the system with a tablet, only one used the system with a TV. When asked why the system was not used with the TV, most parents were either unaware of this feature or had not been provided with appropriate training.

4.4 User dissatisfaction

Many of the young people described situations where the misuse of the system resulted in dissatisfaction and disengagement with the system. In schools, two students reported that not muting the microphone was a significant issue. They could overhear conversations which were not relevant to them, teachers shouting and constantly coughing. For the teacher with the persistent cough, the situation was so poor that the parents provided cough sweets to the teacher.

Some young people were not using the system at after school clubs because they felt the system made them isolated from their peers. It was reported that they could not hear incidental conversations that were happening when the coach had the system.

So, with hockey it was, you know, when people are standing in a line, if they're doing drills, and they're all chit chatting, and it's not the coach. So, she misses out on that when it's already a struggle to hear all the chitchat with the other kids and also in the classroom. You know, if someone's next to her whisper something or so if the FM is on, she loses contact with the rest of the world. And that's quite tough now as we're getting older, totally ...

Similar findings around the inability to hear their peers were observed in a previous study into assistive listening device use (Athalye et al., 2012). It was reported that the deaf young people could only hear the teacher and not their friends or that their peers were quieter and so difficult to hear.

Once again, using the mute function or activating additional programs may have addressed this issue.

Having the system either for group work in school or times when the family gathered at home was reported as a positive feature by the deaf young people. Some young people were using the device sitting in the middle of the table (microphone in omnidirectional mode) and others were passing the transmitter round from talker to talker (directional microphone mode). One young person complained that the system was not very effective during group work as the other members of the group would tap or bang the table.

4.5 Support with the equipment

Faults with the systems were reported by most families. This ranged from broken lanyards to systems failing and needing to be replaced. Professionals working in the field also reported that faults or systems not working appropriately were a common occurrence.

Parents would often contact the service responsible for deaf education in the local authority when a functional part of the system failed. However, one family had to link with the company that supplied the equipment. For parts such as the audio input shoe there was confusion by some families over who was responsible.

Both parents and professionals would often discuss hearing aids and assistive listening devices making the distinction between the NHS being responsible for hearing aids and education for assistive listening devices. In the interviews the parents seemed to accept that faults would arise from time to time as they did with the hearing aids. However, issues did arise when there was uncertainty over whether the fault was with the hearing aid or the assistive listening device. In this situation the audiology department explained that they don't do anything with devices other than hearing aids. Understandably, the families felt that issues should be able to be resolved in one appointment.

We had a problem, and we weren't sure if it was the hearing aid, or the FM system and audiology knew nothing about the FM system which I found quite strange. One of the first times I rocked up with everything and said something's not working. and they said 'I'm sorry we don't do anything with FM systems. We only do hearing aids,' and we said 'Well maybe you should know about the FM systems'.

4.6 Subtitles

Although the sample of participants was small, seven of the families interviewed referred to subtitles which suggests it is an important issue. Encouragingly, this included the family of the pre-school child who used them routinely at home.

What would it cost for them to have just a few captions at the bottom? It will not detract from anyone else, but Sammy cannot get the same experience as everyone else because she cannot see what what's he saying. It's just never ending. We just always go, 'Where are the captions?' During lockdown it was particularly difficult We're getting videos for home schooling, and we have to go back to the school on a number of occasions and say 'Where are the captions?' and they say we cannot do them or we are trying.

The two main issues for school-aged learners during online learning were either the lack of subtitled resources or the accuracy of the captioning system on Microsoft Teams. All but one of the families of secondary students had to complain to the school about the lack of subtitled resources.

Young person: Well sometimes it was quite nice and you can hear a noise ... I don't have subtitles on Teams.

Father: I didn't even know Teams did the subtitles in all honesty. Nothing has been said. ... she has had interactions with her teacher of the deaf to help her do her work. Because there was a period where she was struggling.

Specialist teachers knew to provide subtitled resources, but not other teachers.

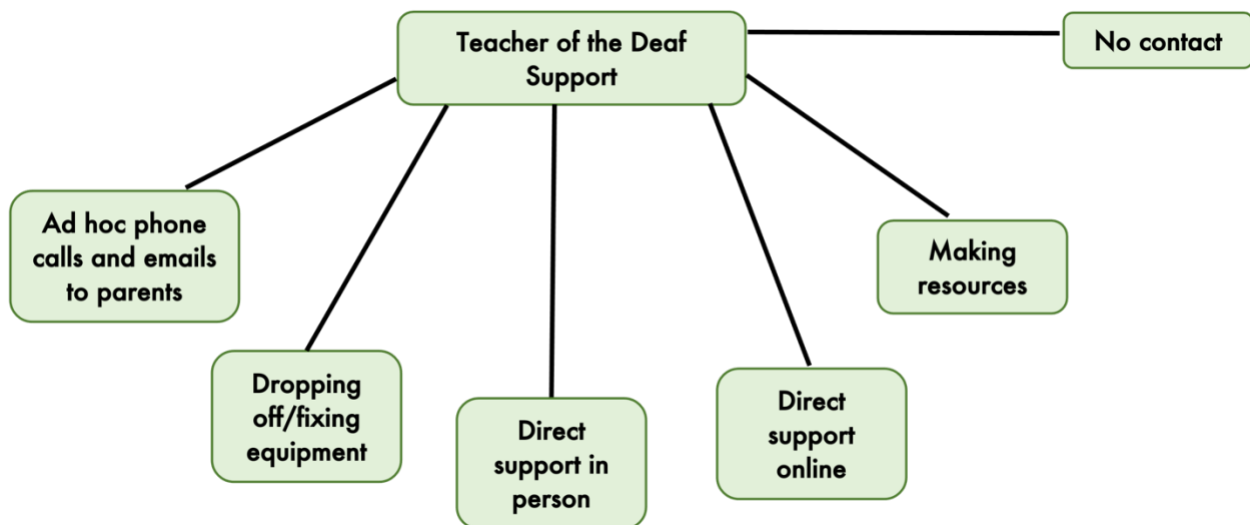
Yeah. The school had Seesaw. It was very new but they had it. ... it was lucky maybe we did have that, and there was that communication but it still wasn't great because I think for Chris, he needs face to face. There were no subtitles. No. Not for Chris, no. But the teacher of the deaf, she had sent some things to do and she always subtitled it. She did some signing videos and under them she subtitled. So the teacher of the deaf did.

Without the subtitled resources, the materials were inaccessible to the deaf student and so meant independent learning was not possible. Families also reported that the inaccuracies inherent within the captioning system in Microsoft Teams prohibited their use.

4.7 Teacher of the Deaf support

In qualitative research a taxonomy is a system to classify items into groups based on their relationship (Bradley et al., 2007). As Figure 4 illustrates, this taxonomy explores the approaches used by teachers of the deaf to support young people during lockdown. Some were a continuation or modification of traditional support methods (direct support, making resources) and others were relatively new (online learning, withdrawal of support).

Figure 4: Taxonomy model for types of support provided by teachers of the deaf during lockdown



Many of the families observed that direct support from the teacher of the deaf was limited or non-existent. Some families received sporadic emails or phone calls to check on the deaf young person. One family observed:

(I would like) more live lessons with the teacher of the deaf. We only had one call from the teacher of the deaf and apart from that it was emails. So it was more asking us how we thought Tania was doing. There was no asking Tania herself how she was doing.

Some deaf children received much less support than usual and parents felt helpless:

And in the second one I try to tell the school, Kamal, he's not like the same as the other children. Because the other children can catch up just with talking. But Kamal he missed it, because I don't know how to sign language.

While for other families, support from the teacher of the deaf varied across the two lockdown periods:

And I have to say, the first lockdown, obviously Mo was at the end of primary seven, and at that point, I would say that was probably in Mo's whole education, that is the most contact she has had with a teacher of the deaf. You were kind of getting weekly chats with your teacher of the deaf? Kind of over Teams. Whereas no teacher of the deaf input at all with the second lockdown.

4.8 Management of the virtual classroom

All but one family reported dissatisfaction with online learning during lockdown. As discussed, limited access to teacher of the deaf support and lack of subtitles were reported as a significant concern. Families also reported that they struggled to access laptops and computers where two-way communication was available.

Management of the online classroom was also a concern, with little or no consideration given to deaf learners' needs. Families reported that too often other students were shouting out answers and comments rather than using the raise your hand function to manage communication. Furthermore, many of their classmates were in noisy households. There appeared to be no guidance given to families about managing noise during online lessons. Assistive devices were rarely used, and this made accessing communication difficult.

.... I did have to email him and say, could you put everybody on mute if they're not talking? Because TVs were being used in the background, vacuum cleaners were on, everyone talking at once, so it didn't work.... Another really young teacher - spot on. Got it. So, she was really good at trying to keep everyone quiet, but it still didn't really work. ... She had a few, one on one/smaller sessions with Sally, rather than the class teacher. Yeah, because we just said, Look, this isn't working. Sally would often end up in tears at the end of it. Sally's really conscientious and tries really hard to do well, so if she's not following and not able to participate, it's quite distressing. We just relied on the computer speakers at home.

Many of the materials that were used to supplement the online classroom were not individualized, and again there was little support from teachers of the deaf to support this. The experience left many deaf students in tears or exhausted and disengaged.

The classroom teacher posted the stuff on Teams and a teacher of the deaf or the support came in and went over some work. But that was ... I think that was later because when they left her on her own accord, she was getting work that wasn't suitable for her. It was difficult work. Whereas the teacher ... Because the work was for everybody in the class, not specifically for her.

Most families when asked what they would change in any future lockdown suggested smaller one-to-one tutorials with teachers of the deaf, subtitled resources, individualised materials appropriate to the deaf learners' needs and better management of online teaching.

5 Conclusions and Recommendations

- A central bank of *training materials* should be created aimed at parents, deaf young people and mainstream teachers demonstrating common uses and good practice for using assistive devices. This could be available on the SSC website.
- *Better joint working* between NHS pediatric audiology services and education services for the deaf. Families should be able to access a single point of contact for support.
- Assistive devices should be available to *purchase through the* national procurement program used by education. The collective approach to purchasing should help to reduce costs.
- Education Scotland and the Scottish Government should set a standard for the use of *subtitles in schools*. How Good is Our School should incorporate this into standard 1.5 Management of Resources to Promote Equity. This would ensure that schools evaluate their provision of subtitled resources as part of the self-assessment cycle.
- Education Scotland should provide guidance to schools on promoting an *inclusive online environment* to ensure that deaf learners have equitable access to education.

Both local education authorities and the NHS shape the experience that the young deaf person has in school and home when using their hearing aids and assistive listening devices. However, no single forum exists to resolve issues when the deaf young person and their families experience difficulties with their equipment. Through teaching on the Audiology and Audiometry course, part of the mandatory qualification for teachers of deaf children, we are aware that not every local authority has access to a hearing instrument test box and so verification of the assistive listening devices is not happening on a regular basis to ensure that the device is working appropriately.

5.1 Joint Clinics

To influence change in favour of access and quality, audiology departments and local education authorities could create and maintain joint clinics that focus on the young person and their experience of listening both in school and beyond. This requires widespread and deep understanding of pedagogy and family issues that present challenges to the young deaf person in everyday life.

The agents for change are:

- audiology departments
- ENT
- Local education authorities
- Education services for deaf children
- Scottish Sensory Centre

The levers for change are:

- funding of hearing instrument test boxes for each local authority through the COVID recovery scheme.
- joint education/health clinics where issues can be resolved rather than each body dealing with their part of the equipment separately.
- Creating a bank of training materials on a central website (Scottish Sensory Centre would appear the most obvious) which allows families and professionals to become aware of the different features of the assistive listening devices.

5.2 Collective purchasing power

The cost associated with lost or damaged equipment remains a barrier to widespread access to assistive listening devices outside of school. The market remains dominated by a single supplier with little competition. Each local authority purchases the equipment from this single supplier or bodies that are licensed to sell the equipment on their behalf. Collective purchasing power would allow a more competitive price to be agreed and this could be achieved through the national procurement program.

The agents for change are:

- Scottish Government
- COSLA
- Local education authorities
- Education services for deaf children

The levers for change are:

- Agree a national specification framework for assistive listening devices.
- Assistive listening devices should be included on the national procurement program used by education so that there is a single price for equipment. This will allow local education authorities, universities and colleges and Access to Work to purchase systems at a single cost.

5.3 Subtitles

An interesting feature around the specific communication needs of the young deaf person (BSL or hearing aid user) and inclusion in Scottish education is that it is virtually invisible in key documents that offer advice and guidance to schools. This matters because these key documents shape school improvement priorities and frame the cycle of self-evaluation. Unless key documents such as How Good is Our School? (HM Inspectorate Education, 2015) refer to core strategies that allow communication for all, self-evaluation is unlikely to happen. The pandemic exposed this gap during online learning and resulted in many deaf learners being disadvantaged. Core documents must ensure that subtitles are regarded as standard and that there are clear guidelines about what a virtual classroom should look like.

The agents for change are:

- Scottish Government
- Education Scotland
- SQA
- Local education authorities

- Education services for deaf children

The levers for change are:

- Core documents such as How Good is Our School? refers to the use of subtitles.

This should incorporate into standard 1.5 Management of Resources to Promote Equity (HM Inspectorate Education, 2015).

- Subtitling providers, such as Learning on Screen

(<https://learningonscreen.ac.uk/ondemand>, accessed 06/06/21), should be available to schools.

- Guidelines are created on promoting an inclusive online environment to ensure that deaf learners have equitable access to education. For example, by the use of Chrome as the browser and automatic subtitles, which are often more accurate than Teams, for example.

5.4 Dissemination and Impact

This is the first qualitative study in Scotland into the use of assistive listening devices outside of school and the experience of young deaf people during online learning. The results will be published by the NDCS and hosted on the SSC website, along with a plain English summary which we will also make available in BSL. We are interested in holding a webinar about the results open to parents, professionals and policy stakeholders to further discuss the findings.

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7 Appendix 1 Interview schedules

Interview Schedule Parents

Aims – To explore deaf children’s use of FM systems at home in their family and community.

Objectives

1. To establish the support provided by professionals so that families could use the FM system at home and in the community.
2. To establish if there is routine access to FM equipment in the home and community.
3. To explore the types of support and training available to families and deaf young people on the use of the FM equipment.

Question	Why	Notes
To parent: check name of deaf child, how getting on at school. Run through right to stop or withdraw. Have they discussed it with child	Warm up question	
To parent and/or child: Have you got a radio aid at home? Can you show us?	Technical details of the FM system,	Follow up. How did (child name) use it during the summer term?
How long have you had the FM system for?	Establish length of time that the child has had the system.	
To child: what difference does it make for you when you have the FM on?	Also establish if child likes it and why.	
To child: Now you are back at school, do you take the FM in every day? Have the teachers been using it the same as normal?	To see how child perceives heightened fears from teachers about cleaning passed on equipment	
When you got it from the school, did the ToD give you some training	Often not much about trouble shooting – this takes time and there may not have been time and it would not have been face to face	Find out if online or phone back up from the school service
Do you know why the FM is useful?	To see if they have had it explained to them	Much more likely to use it if they understand what advantages it has

Do you and your child use FM outside?	Explore contexts	Because of Telling it like it is research – communicating outside difficult
How did your child use FM at home for learning?	Follow up about direct input to mobile or computer	
Did your child's school do lessons online with voice and/or video streaming?	Explore if this was one or two way and how the child participated	Many school services were not able to find ways to use 2-way learning -
	Find out if parents were aware why the LA chose this policy and their views on it.	Are parents aware of their deaf child's rights to a continuing education?
How often did you have contact with the ToD or someone from the service during lockdown?	Probe more about type of contact – phone support, dropping things off, establish what the family felt e.g. abandoned, well supported.	
Do you know how to check the FM is working properly?		
What difference do you think it made to your child's learning during the lockdown learning time?		
If there is another lockdown, what would you like to see changed about the use of the FM and support from the school service?		
Do you have any questions about the study or how we will use the data?		
Check they are feeling OK – we can send on list of support organisations after the interview	Some parents could get upset because the pandemic has been so disruptive to families' lives and to their deaf children's education. Only needed if parents seems upset.	
Finish up by saying what the outcome will be. Report will be on the SSC website, sent to NDCS and we will circulate this for parents to read the results. Once again, explain anonymity and no identifiable features. Thank you for taking part. We hope our recommendations will improve services for deaf children and their families.		

Interview Schedule: Professionals

Purpose – to establish the views of professionals (e.g. SALT, TOD, Support Staff, Audiology, Cochlear Implant Centre) on the use of FM systems in the home and during the Covid-19 lockdown periods.

<i>Question</i>	<i>Why</i>
Run through right to stop or withdraw.	Part of consent
What professional field do you work in?	Warm up questions
To professional: check the area they work in, how many years working in the field?	Warm up question
What type of FM systems are you familiar with?	Technical details on the type of FM system,
How have you supported the use of an FM system? Was this at home or school?	Also establish practical knowledge of an FM system
What are your understandings of the expected outcomes from fitting an FM system?	Establish knowledge about the purpose of an FM system.
What challenges do you think may exist when using an FM system at home and school?	Establish key challenges when using an FM system.
Are FM systems used at home in the area you work? Parents' views and levels of experience?	Knowledge of systems in their area.
How has the way you work with deaf children changed during the pandemic?	To find out if service declined, was maintained, if relationships with professionals and parents and young deaf people changed during lockdown.
Do you have any questions about the study or how we will use the data? Finish up by saying what the outcome will be. Report will be on the SSC website, sent to NDCS and we will circulate this for parents and professionals to read the results. Once again, explain anonymity and no identifiable features. Thank you for taking part. We hope our recommendations will improve services for deaf children and their families.	Part of ethics