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LEARNING, TEACHING AND ASSESSMENT

A guide to good practice for staff teaching d/Deaf students
in science and engineering.

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Introduction

All d/Deaf* students are individuals and have individual needs. No single booklet can provide a set of definitive rules that will work in each situation with each d/Deaf student. The guidance in this booklet should help you understand the basic issues in teaching, learning and assessment whilst teaching science or engineering to d/Deaf students.

Communication

Deaf and hearing-impaired students use a variety of communication methods to gain access to education. Some students use British Sign Language (BSL), and others may use lip-reading and the services of a note-taker to be able to follow what is being said. Partially-hearing students may require specialist equipment and others may not seem to have any additional needs at all. The communication methods d/Deaf or hearing-impaired students use vary according to when they became deaf, their parental and social background, and their schooling. Most d/Deaf people use a variety of communication methods, sometimes simultaneously.

No communication method used by d/Deaf and hearing-impaired people is inherently better or more effective than another – it depends on the individual and the precise nature of their hearing loss.

Deafness

There are over 8,000,000 deaf people in the UK. Of these, only 50,000 use BSL as their first language. Most deaf people use English as their native language. Deafness is a condition not only of loss of volume but also of loss of frequency when hearing. This means that a person can often hear in some situations (for example, when it is quiet or if the speaker has a deep voice), but not in others. This is a normal part of hearing loss, which will affect 75% of us after the age of 70.

Hearing aids do not restore 'normal' hearing in the same way glasses restore normal vision. They can increase the volume of sound, but cannot fully compensate for loss of frequency.

Most people who use BSL will refer to themselves as Deaf. Others who have become deaf later in life may label themselves as hard of hearing, partially deaf or something else. If you are not sure which term to use, check with the d/Deaf person you are talking to.

*Please note that 'deaf' written in lower case denotes the medical condition of hearing loss. Upper-case 'Deaf' is the political and social term for belonging to the Deaf community. It is used in the same way other nationalities and groups would be spelt with upper-case letters, e.g. Spanish or Muslim.

Language issues

Most adults with a hearing loss have English skills equivalent to those of hearing adults. This is because they will have developed their hearing loss after learning how to speak, read and write. However, for many people who have been profoundly deaf from an early age, their deafness may have a significant effect on their use of English. Deaf people, depending on when they became deaf, miss out on learning language through informal immersion by picking up sounds and language around them. Particularly critical is the loss of exposure to language as it is used in situ, in formal and informal situations, with different intonation and inference.

Many Deaf people who do not use English as their first language will use BSL instead. British Sign Language is not a signed form of English or a collection of gestures. It is a fully functioning language with its own grammar and syntax, which is very different from the syntax of English. BSL can express the same complex concepts and ideas that any other language can.

Lip-reading is a challenging and tiring activity which, on the surface, would seem to be a substitute for hearing. In reality, only approximately 30% of English speech sounds can be lip-read

Good communication strategies

You will not be the first hearing person the deaf student has ever met and the student will have a variety of strategies for helping effective communication. However, here are some tips when talking to a d/Deaf student:

- Get the student's attention before you start to speak, for example by waving your hands or tapping lightly on the student's shoulder.
- Try talking to the student first. If you both feel that you are not communicating well, try writing things down.
- All d/Deaf people will find it useful to see your lips, either to supplement their residual hearing or to try to lip-read you. Please don't cover your mouth with your hand, pen or other item. Please avoid walking up and down in front of a class if there is a d/Deaf student in the group. Also, if there is a light behind you, like a window or a lamp, your face will be in shadow and the d/Deaf student will not be able to see your lip patterns easily.
- The d/Deaf student may not be able to lip-read what you are saying so you may have to rephrase it.
- Don't shout at the student or over-exaggerate your lip patterns; this will only distort what you are saying. The easiest way to communicate is to speak clearly and at a normal pace.

- There may be too much background noise in the place where you are having a conversation with your student. Moving away from the noise or finding a quiet place may significantly improve communication.
- If the student is using a support worker, for example, an interpreter, note-taker or lip-speaker, always talk to the student. The student will be looking at the support worker, but it is important to remember who the conversation is between.

Working with support staff

Support staff work with you to make sure that your teaching is accessible to the whole group. Understanding their roles and needs is essential to an effective working relationship.

Note-takers aim to produce a verbatim record of everything that is being said in any teaching situation – like subtitles on the TV. They also have to note informal information like sarcasm, emphasis or comments from the other students. If students use notes as their primary way of accessing information given in lectures or seminars, the notes, not the lecture, become the main source of learning. The students will only receive what the note-takers have written down. If things are missed out of the notes, there will be omissions in the students' learning, unless they can find out what has been missed and supplement their notes with self-directed learning.

Given that note-takers can only write about 30 words a minute, whereas spoken language uses about 180 words a minute, it is inevitable that students will miss important information. Making sure note-takers are given handouts and copies of your notes before a lecture will let them annotate this information, significantly increasing the information students can gain.

Accessing and analysing these notes can be a useful evaluative tool for lecturers to improve their communication skills with d/Deaf students.

British Sign Language/English interpreters offer simultaneous translation from English into BSL and from BSL into English. They are trained to work to a code of ethics that guides their professional conduct. All interpreting is tiring and interpreters who work on their own for long periods will need breaks. Occasionally, two interpreters will work together to provide an uninterrupted service. BSL has a different grammatical structure to English, so an interpreter will have to wait until a sentence is finished before starting to interpret. Speak at a normal pace, addressing the student not the interpreter.

Usually, interpreters will not be trained in the subject they are interpreting. They may have to ask you for clarification of a word or concept. Providing interpreters with handouts, reference materials and glossaries will help them to better support the student and reduce the number of times they may have to ask for clarification.

Lip-speakers repeat everything that you say, clearly and silently. They may also use finger spelling and some gestures. This is also a tiring activity and they will need regular breaks. Giving lip-speakers handouts, reference materials and glossaries will help them to support your teaching.

Audiological equipment (radio aids or a Phonic Ear) is usually made up of a receiver and a microphone transmitter, which will not amplify your voice, but will transmit what you are saying directly to the student. The equipment can be useful, but the student will only be able to hear what the person who is using the microphone is saying, rather than also being able to hear what other students are saying. While using this equipment, it is vital that you either hand around the microphone so each person who is speaking uses the equipment, or repeat what other people have said for the benefit of the deaf student.

Radio aids work over a great distance and through walls. If you leave the room and do not want to be heard, make sure you switch the equipment off.

Health and safety, and assessing risk

It is essential in all teaching situations for lecturers to take a pro-active approach to health and safety. Hazards must be identified and all risks assessed. If you are in doubt when identifying or assessing risk associated with d/Deaf students, contact your health and safety officer or disability officer.

As part of the risk assessment, you should:

- list the dangers;
- list the people who are at risk;
- list control measures; and
- specify what further action is needed.

Review the risk assessment regularly and revise it if necessary, particularly in light of changes in the workplace or process, or if there is a change in the client group that may be affected.

TEACHING ISSUES

There are a number of teaching and learning situations that are challenging for d/Deaf students. Here is a list of the most common ones in science and engineering, as well as some suggested solutions.

Use of language and specialist terminology

Some Deaf students use English as their second language. However, unlike foreign students, they do not learn new terminology just by hearing it in lectures. Science and engineering subjects use a large number of complex specialist terms. For all students, understanding and being able to use specialist terminology is essential. For d/Deaf students for whom English might be a second language and who receive the taught content of courses through a third party, an interpreter, note-taker or lip-speaker, it can be particularly problematic. Such support staff are unlikely to be specialists or necessarily have an understanding of the terminology themselves. Lecturers can assist by providing glossaries of key terminology, by using concise, plain English language in spoken and written communication and using for example 'open questioning' and regular phase testing to ascertain understanding. Linguistic problems are further compounded for BSL users because all proper names and new terminology have to be fingerspelt. Writing such terminology on the board reinforces it and therefore assists all students.

Course handouts and information

As described above, course information needs to be clear, precise and where possible written in plain English. Unlike hearing students, d/Deaf students cannot read handouts and listen to you at the same time. They can either watch you or their interpreter or look at the handout. If they need to do both as part of a planned task, they will need to be able to review such material in advance of the teaching session.

Encouraging student participation

When asked a question or invited to participate, most students need a few seconds to formulate a response. Deaf students who are working with a support worker will only receive your question or instruction seconds after it has been made, due to the time lag needed to translate or note your question. They will then still need to have another few seconds to think about their responses. Deaf students often miss out on sharing and contributing in class as the opportunity to make appropriately-timed responses has gone. Similarly, if d/Deaf students want to respond, there needs to be time for the students to write down their responses or for interpreters to understand their contributions before they can voice them.

Formal/theoretical lectures

Deaf students (and support staff) benefit from preparation before lectures and providing information in advance allows them to maximise what they can learn in your session. During the lecture, writing new terminology on the board will aid d/Deaf learners. Giving d/Deaf students handouts, overhead projections and a copy of your lecture notes does not give them an unfair advantage. Even with these, they will struggle to gain anywhere near the same level of information as the hearing students.

Slide shows

When showing slides, rooms are usually dark and students will not be able to lip-read you, or see the interpreter, lip-speaker or note-taker. Also, d/Deaf students cannot look at a slide and their support worker or your lips at the same time. If you want them to take in the information you are saying about the slide and see the slide as well, you need to give them extra (silent) time. Providing an Anglepoise lamp for support workers means that you can turn off the main lights.

Working with a computer, data projector or overhead projector

As with slide shows, students cannot look at a computer, data projector or overhead projector screen and their support worker or your lips at the same time. You may need to pace your presentation to take account of this.

Showing videos

Ensure any off-air recordings made to support your course use a VCR that can record subtitles. If you are using pre-recorded or bought videos, try to provide subtitled programmes. If they are not available let students borrow a copy of the video beforehand so they can watch it with an interpreter or have a transcript made by a note-taker. Tell the students why you are showing the video and what you will be asking students to take note of when watching it. Students can then prepare themselves to participate equally in the class.

Classroom delivery

Deaf students often sit at the front of the class so they can see you or the interpreter easily, but this means they may not be aware when other students are speaking. Acknowledging the contribution of another student by pointing is very helpful for d/Deaf students and support staff.

Group work

Students are regularly given assignments that involve working in groups. Being able to communicate freely, without considering the seating arrangements or whether a support worker is available, advantages all-hearing groups. If there are a number of d/Deaf students on the same course, they are almost always put together in the same group. If possible, put them in mixed groups so they have the opportunity to work and learn with a wider representative group. It is easier for d/Deaf students to follow group discussions if everyone sits in a circle and speaks one at a time. This also makes it a lot easier for interpreters, note-takers and lip-speakers to translate and report everything that is being said.

Equipment demonstrations

Demonstrating how to use equipment presents particular problems for d/Deaf students. They cannot look at the process you are demonstrating and your lips/their interpreter at the same time. This means students will have to look away from the demonstration to watch their interpreter and will therefore miss out on instruction. It is important in these situations to use a consecutive teaching technique. First explain the equipment and what you are going to do with it, then say it again while actually doing the demonstration, then check for the students' understanding.

Laboratory work and experiments

There are different forms of experiments required in science and engineering subjects. If the experiment requires concentration and is made up of a series of steps which need to be completed without interruption, then it is important to note that d/Deaf students will need to have all the instructions before beginning the experiment, as they will be unable to listen to further instructions without having to look up and interrupt the experiment. It is useful for d/Deaf students to have the chance to 'try out' an experiment first, to ascertain for themselves if they have understood all the instructions. If they need more clarification, the opportunity to ask questions should be given. Please make sure that any additional explanation is given in a discreet and supportive manner.

When students are BSL users, they will be unable to use both hands to undertake the experiment and comment on the process or answer questions at the same time.

Paired experiments

When students are working in pairs to undertake an experiment, the above needs to be taken into account. A BSL user will not be able to use two hands to undertake lab work and communicate with their partner at the same time. These pairs may need a little additional time to complete an experiment.

Dissections

When instructing students on how to conduct a dissection use the consecutive techniques described in the equipment demonstration section. There are many free virtual learning materials on dissection on the internet which can be used as preparation materials for support staff and d/Deaf students.

Scientific/engineering equipment

Deaf students cannot look through optical equipment, for example microscopes, telescopes or surveying equipment and 'listen' at the same time, like hearing students can. It is important that lecturers are aware that students, when required to avert their gaze to look at such equipment, will require time to do this. Continuing to speak or instruct will mean they will miss information, or they will be interrupted in their task by support staff.

Some courses require the use of specialist equipment that usually relies on hearing, for example, a stethoscope or a Geiger counter. If such equipment does not have a visual display, then the student may require alternative equipment. Such equipment can be purchased through specialist suppliers and can usually be paid for through the Disabled Students' Allowance.

Fume cupboards

Fume cupboards are usually designed for one person and direct the sight of the user against the wall of the cupboard. Issuing instructions first will allow the student to complete their assigned work without missing any information given subsequently.

Workshops and machinery

Working with machinery presents very specific health and safety risks for all students, particularly d/Deaf students. When preparing risk assessments for any process involving dangerous machinery, consider the needs of everyone.

Noisy workshops may render hearing aids useless. When instructing on the use of these machines, try to turn noisy equipment off or temporarily move to a quieter space. It is also not possible for a d/Deaf student to watch a demonstration of a piece of equipment while watching your lips or an interpreter/lip-speaker. Providing consecutive, rather than simultaneous instruction is essential in this situation. If possible, instruct students first, then allow them to watch your demonstration - step by step if necessary.

Some machines have audio alerts as safety features. If there is a visual alert, point this out to the student.

Safety equipment

Safety equipment suitable for d/Deaf students is available from specialist suppliers. For example, there are safety glasses that do not interfere with hearing aids or radio aids. Ask your disability officer for further information. Any safety equipment which obscures the mouth may cause communication difficulties for d/Deaf students and a consecutive instruction technique may be required, as well as extra time for any communication if the student is working with a partner.

Mathematics instruction

Equations and calculations performed on the board can present particular barriers for d/Deaf students. Unless they have a note-taker, they will not be able to write down the equation and watch the lecturer/interpreter/lip-speaker at the same time. Additionally, when a lecturer demonstrates an equation on the board, they usually face the wall, making lip-reading impossible. If the student is a BSL user, the equation will be interpreted, but due to the spatial nature of BSL, it can be difficult to tell where numbers are placed and simultaneous equations can be difficult to follow. Pausing at intervals to allow d/Deaf students to take in the information from the board, will allow them to keep up with the pace of the delivery.

One-to-one tutorials

During tutorials, make sure that the student can see you easily. Sit face to face whenever possible. Do not expect students to be able to look at a diagram or be able to see what you are pointing at while you are still talking. Use the consecutive techniques described earlier to enable the d/Deaf student to fully engage in the tutorial. An interpreter or lip-speaker, if present, should sit next to you so that the student can see you and the support worker at the same time. If a note-taker is used, let the note-taker sit next to the student.

If a tutorial needs to be cancelled or postponed, please consider the difficulties a d/Deaf student may have in making alternative support worker arrangements.

Field trips

Please make sure that d/Deaf students have enough time (one to two months) to book support workers for a field trip or visit. If a field trip is longer than a day, then the social needs of the student, as well as their academic needs, may need to be considered. Additional support staff may be needed for d/Deaf students to be able to take part in social activities in the evenings. When demonstrating or on a tour, interpreters need to get near to the speaker so they can hear you. Please wait until they are in position and have a clear sight-line to the student before commencing instruction. Note-takers may not have anything to lean on and may need more breaks as a result.

ASSESSMENT

Before the course starts, support services will have identified any specific needs so the student can be fairly assessed. These are usually general guidelines and sometimes, depending on the type of the assessment, there will be other things to consider. As a general rule, all students should complete all assessments. You should only consider exemptions or other assessment if the student would be excluded from the activity or otherwise disadvantaged because of the way it is assessed.

Clarifying what is being assessed

Some assessment mechanisms present particular barriers for d/Deaf students and it is important that course validation and review processes consider the needs of these students. Deaf students may need to use another method to complete the task, but the outcome may be the same. If the process is being assessed, what additional tasks do d/Deaf students have to do to achieve the same result, and should they be given credit for this?

Below are some thoughts to consider when assessing different tasks.

Assessing oral presentations

Deaf students who use speech will be able to complete oral presentations in the same way hearing students do. However, BSL users may need to use an interpreter to voice over what they are signing. Depending on the assessment criteria, this changes what assessors should be looking at. It is important that the student, not the interpreter, is assessed.

Assessing exams

Exam questions should be phrased in a way that does not confuse students, for example, by using clear English, short sentences and direct questions. Some students are allowed to have their exam papers altered by a lecturer for d/Deaf students. In this case, only carrier language, not technical language, can be altered. You should be present while the language is being altered as this will result in the most appropriate exam script.

When essay answers are given, remember that students may be writing in their second language. Students may have an assessment of need that determines that scripts should be marked for content rather than correct syntax and grammar.

Assessing essays

It is common practice for many d/Deaf students to have their English checked by another person before they hand in essays. However, they may still have some mistakes in their syntax and grammar. It is important to be clear whether the assessment criteria demanded correct grammar as well as knowledge and understanding of the topic.

Assessing practical work

When assessing laboratory techniques, make sure that the student has had the opportunity to try out the experiment, so that they are clear on what they are required to do, and then assess them on their technique.

Assessing group work

While completing group assignments, groups that include d/Deaf students usually have to undertake additional administration tasks to meet and work efficiently together. For example, they will have to organise times when an interpreter can be available rather than when all of the group have free time. In these circumstances it is helpful if time during the lecture can be made available as a support worker should already be present. If the assessment criteria include an assessment of the group's work process, lecturers should take account of the extra work that the group has to do.

Useful resources

Online glossaries in BSL/English:

www.sciencesigns.ac.uk

www.engineeringsigns.ac.uk

www.builtenvsigns.ac.uk

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