UNIVERSITY OF CAMBRIDGE
Disability Resource Centre

Teaching Students with Visual Impairments

Disability Resource Centre
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There are many students with a visual impairment studying at the University. While a few of these students are blind, the majority have low vision. This may not always be obvious to the observer. Most students with a significant visual impairment will require specific assistance in order to manage their learning. The type of assistance required will vary according to the degree and nature of their impairment. Some may experience blurred or distorted vision, others may lose side vision, central vision or see only half the field of view. Some may have severe problems with glare. Remember to discuss directly with the student his/her individual requirements.

Guiding a student

Students who have a visual impairment may indicate that they would like to be guided. If this happens, ask how they would like to be assisted. If more than verbal assistance is requested, the student will usually hold your upper arm, just above the elbow, while you walk slightly ahead, indicating verbally any changes in surface, gradient or direction. Identify yourself when saying hello and indicate verbally when you are entering or leaving the student's presence.

Keep the environment in which the student normally moves as constant as is practicable eg do not move objects from their normal place without advising the student and keep corridors clear of obstacles. Doors should be kept either closed or open, not partially open.

Working with guide dogs

Guide dogs are highly disciplined and should not be distracted or petted when working. Only approach a guide dog with the owner's explicit permission.

Lectures

BEFORE the semester begins:

- Provide reading lists, lecture handouts, PowerPoint presentations **no less than 4 weeks** before they are required, to the Disability Resource Centre team and in priority order to allow time for taping and/or Brailling of texts. Preparation in Braille or audiotape takes time, so planning well-ahead is essential if the student is to have texts available at the commencement of the semester. In addition, organising the appropriate equipment requires time.
- Aim to meet the student with low vision prior to the commencement of classes. Some students may provide a report which sets out how their impairment impacts on their study requirements and advises a range of strategies which may assist them
- Ensure students are aware of emergency and evacuation procedures for the buildings they are using

BEFORE the lecture or tutorial:

- Forward copies of overhead materials to the Disability Resource Centre in advance of the lecture for adapting into alternative formats if that is required.
- Consideration of their position in relation to visual aids can be very important for a student with visual impairment, therefore have AV set up at the start of the session and allow students choice of where they sit.
- Small fonts, fussy designs, and poor contrast between text and background in on-screen presentations can all make life difficult.
- Use at least 24 point text and keep designs simple. Black or dark blue on pale yellow is often best. Similar to colour-blind students, some visually-impaired

students have specific requirements when it comes to visual aids. Communicating with the student beforehand as to his/her requirements is the most supportive viewpoint to take.

- Allow time for people to absorb what's on the screen.
- Distribute copies of overhead materials to the student if this has been requested.
- Ensure the student is notified of organisational changes - s/he will not be aware of messages left on noticeboards or changes in lecture venues pinned to lecture theatre doors.
- **Ask** the student if assistance is required - do not presume that help is needed or that it will be readily requested.
- Tell the student if planning to use a video.
- Discuss alternative ways to approach information that may be missed eg ask a sighted student to watch the video with the student and to describe the visual aspects.

If videos are to be used on a regular basis, arrange for the Disability Resource Centre team to identify an assistant to view the video with the student at an alternative time.

DURING the lecture:

- Be aware that teaching strategies useful for students with a visual impairment may be useful for everyone.
- Try to understand and act upon the requirements of a student with a visual impairment; this is one of the most supportive strategies you can adopt.
- Express yourself simply, clearly and in a normal voice.

- Stand where glare is minimised if the student is partially-sighted eg do not stand with your back to the window.
- Identify yourself by name in case the student does not recognise your voice.
- Express written information verbally eg when viewing overheads or writing on the board.
- Ensure information is provided in appropriate formats - enlarged copies of the required size, Braille, disk or audiotapes.

Supervisions

- Although electronic journals and the internet have increased access, not all on-line journals are designed in an accessible way making them difficult or impossible to read with assistive software. This should be taken into consideration both when setting supervision work but also marking an individual students work. Try to draw on a wide variety of sources, and check their accessibility, or what provisions need to be made to make them accessible. If the student is required to use certain websites for research, it is important to ensure that these are compatible with screen-reading software such as JAWS
- All visual impairments increase the time and effort which students must expend in activities of daily living, as well as in activities related to their studies. **Be aware of this** if a student is making requests such as extra time for the completion of essays and worksheets
- Avoid using graphs and complicated diagrams in the supervision, ensure that the salient features can be explained via words. The latest brailling software can reproduce simple diagrams, flowcharts etc. Avoid

using colour as these cannot be represented by Braille.

- Give directions in words not gestures. In addition, supervisors should use strategies to verbalise some of the visual cues by being more explicit in their choice of language. A simple example would be replacing comments like "over there" with "directly behind you", or ensuring that when referring to written material i.e. "we've got to make sure we follow the instructions in paragraph two" the instructions are also read aloud. This is especially relevant when the student is using Braille as when a document is converted to Braille, it can more than double in length thus making references to ‘second paragraph on page two’ useless.
- Verbally express your feelings as the student may not be able to see your body language.
- Do not single out students with a visual impairment or discuss their requirements in front of a group.

Examinations

Students who are blind or visually impaired usually require alternative examination arrangements. These can include: examination papers produced in alternative formats (Braille, audiotape, large print), the provision of extra reading and/or writing time (this varies but may be as much as double time for some students with visual impairments), use of amanuenses or readers, sitting the exam in a separate room.

- Examination papers which are required in Braille format need to be submitted well in time to allow for the Brailling process.

- If the student is going to access the exam paper using a computer you should ensure an electronic copy of the exam paper can be fully accessed by the student's assistive software. As screen-reading software will distract other students, there is also likely to be a recommendation that blind students sit their exams in separate accommodation. Most visually impaired students will be entitled to additional time.
- Thought should also be given to question design. Any questions that rely on visual cues will not be accessible for blind students. For example, questions that refer to pictures or ask students to interrogate complex diagrams. Simple diagrams can be made accessible using Braille.
- Check the wording still makes sense if being read aloud, this is a particular issue for multiple choice questions.
- For partially sighted students, again you should ensure the exam paper is in an accessible format, for example enlarged font, or a coloured background. Certain fonts such as Arial and other sans serif fonts are better than others.
- In the exam ensure that the invigilator is briefed about what has been agreed with the student and has a hard copy of the exam paper. In particular if a student will be completing the assessment electronically ensure the invigilator knows whether the student is expected to hand in the disc or a printed hard copy.
- There may also be environmental issues to consider for partially sighted students such as the positioning of computers etc. to avoid glare from a window.
- When marking exam scripts it is important to note that blind students can make spelling mistakes based

on a phonological spelling of words. They should not be penalised for this. This may take the form of a tutor issuing a warning when the answer scripts are being marked during Tripos examinations.

- If students are asked to comment on written material as part of a viva, you will need to ensure the format is accessible. Also consider as part of this, what the impact of the format is. Asking a student to engage with reams of large print notes may cause them to get lost or become flustered in a pressured environment. You need to consider whether the task itself can be altered and how this can be done equitably.

Case study:

- Cliff Beevers
Mathematics Department
Heriot-Watt University Edinburgh

Introduction:
I was diagnosed to have Retinitis Pigmentosa (RP) in 1964, as I came towards the end of my first year as an undergraduate in the Mathematics Department at Manchester University. RP is the second largest cause of blindness in the developed world and it affects some 1 in 2000 of the population worldwide. RP remains incurable today though much progress in research has taken place over the last thirty years.

However, if there has ever been a time to be disabled I would argue that the last period of time has been the best. There has been a growing understanding of the difficulties of the disabled, more sensible and targeted help and, in my case, a range of electronic aids to assist in my job.

Experiences as a student:
When diagnosed I was advised by the ophthalmologist to 'leave University and do something more suitable for employment'. This is advice I did not take, though doubtless generations of students at Heriot-Watt University in Edinburgh do wish I had taken it! However, other people were more helpful and the personal example of Professor Bickley, a blind professor at Imperial College in London, was inspiring. He found time to see me following a request from my Manchester tutor, and allowed me to feel that my goals were achievable. Role models like him can play a more important part than might be thought.

I had always wanted to teach, so when I graduated with a first class honours degree in Mathematics in 1966 and was given the chance to stay on, I took the opportunity with alacrity. I gained a PhD in Applied Mathematics in 1969 and joined the Mathematics Department at Heriot-Watt. I have taught there since 1969, gaining promotions to Senior Lecturer and then Professor. I enjoy my job and have taught thousands of engineering and science undergraduates, as well as honours mathematicians, through many years.

Support Received:
Over the years the Employment Service has been helpful with access to work initiatives, although it still needs persistence and assertiveness to make the Service work best for the individual. A particularly useful period in the middle 1980s saw an outstanding Employment Service worker facilitating a group of visually impaired professionals meeting in Edinburgh four times a year to discuss the solutions we had each found in our workplaces.

We invited manufacturers of equipment to attend and saw the latest inventions before they hit the marketplace. This was a time when aids like closed-circuit television, scanners and talking computers were in their infancy. Currently, the range of equipment I use includes a small tape recorder for note taking, a flat bed scanner, and a screen reader – though for many years the closed circuit television was a real bonus. With the CCTV, written material placed under the camera can be viewed on a screen. Magnification is increased very simply at the turn of a knob, and in my case the reversal of the image was invaluable in that black print on white paper becomes white words on a black screen. I used the CCTV from the early 1980s until the middle 1990s, when it became necessary to start to use a screen reader for the computer. 'JAWS' can cope with word processing, spreadsheets, email and well-designed websites. The scanner too has been most useful as it can take printed pages and convert them into readable Word files. Mathematical display is a problem and neither JAWS nor the scanned image can cope with the layout of fractions, powers and more complex equations, though there may be some progress on this front using MathML tagging in the future. Good as the electronic aids have been, nothing can compensate for the role humans and animals play in the life of someone with severe sight loss. A succession of human readers have played a vital part in helping me cope with the job by reading research papers, mathematical texts and examination scripts.

Some of this was achieved by support from the Employment Service, though often my wife and daughters have had to go the extra mile by reading something late at night or early in the morning in case the contents were needed that day. I have also been blessed with two excellent guide dogs: Kimmy from 1988 served me for eight years and Tenko is now in his sixth year of work.

Kimmy died recently and her subsequent owner buried her with the epitaph ‘Simply the best!’; though in Tenko’s case his motto would be ‘Simply the pest!”.

Seriously, the additional mobility and freedom these two animals have given me has been enormous, and I owe a great debt of gratitude to the Guide Dogs’ Association who deserve all the praise they receive.

Issues and Reflections:

Loss of vision is not easy to accept but there are silver linings. It was my disability that first led me into the area of computer aided assessment. I could see that the computer in the early 1980s could contribute to the learning process for undergraduates but, in addition, its introduction meant that I could engage more meaningfully in student tutorials, since I could read their work on screen in a way I could not read their handwriting. Later, when I was finding it difficult to read at all, I asked the undergraduates to talk through what they had written, and this ensured a much more interactive and empathetic style of teaching.

For lecturing I have used prepared overhead projection sheets and I memorise the content of my lectures, perhaps easier in Mathematics than in other subjects. My colleagues have been very supportive over the years and I like to think I have helped them along too. Various collaborative efforts have resulted in CALM, CUE and SCHOLAR, which provide computerised tutorials and online learning and assessment resources. I am now co-director of the recently formed Scottish Centre for Research into On-Line Learning and Assessment (SCROLLA).

Summary

For students with visual impairments, the following checklist may be used to ensure appropriate arrangements are being made (checklist from *The needs of disabled students in further and higher education* produced by SKILL).

- Time to get used to the campus or site
- A support teacher or worker, or a sighted guide
- A personal reader
- Tape or Braille transcription services
- Handouts and booklists in advance for transcription
- Course material in Braille or in large print, on tape or on disk
- A tape recorder
- Scribes, amanuenses or notetakers
- An explanation of visual aids in lectures (or alternative methods of teaching)
- Arrangements for practical and field work
- Specialist equipment, eg closed circuit television, computers with speech synthesisers, Braille notetakers, text scanners, etc
- A private study area in the library, longer book loans and special arrangements for photocopying
- An exercise area for your guide dog
- Good lighting, adequate signs and good colour contrasts on signs and buildings

Resources Available

- Disability Resource Centre

Disability advisers help students organise the help they need due to their disability. This can include note-takers for lectures via the Non-medical Assistance Scheme (NMA). There is also a library of electronic equipment such as mini-disc recorders, software etc. available to

students. In addition a brailing service is available whereby lecture handouts, supervision sheets, PowerPoint presentations and books without electronic copies can be converted into Braille for the student with prior arrangement with the department.

- Disabled Students' Allowances
Awarded by the Local Authority (previously the LEA) to home students, the DSA is designed to cover any of the additional costs of studying in Higher Education by a disabled person. The allowance pays for any equipment or human help that is needed in order for the individual to study effectively. In the case of students who are visually impaired, this may be in the form of note-takers and other non-medical assistance or electronic equipment, software such as laptops, screen-reading software.

- College Tutors
College tutors can provide support for the student in a number of ways such as helping make arrangements for extra time during examinations. They can also put the student in contact with the Disability Liaison Officers in the relevant department ensuring that the arrangements have been made for the student.

Further Information:

- A source of adapted technologies for visually impaired students is: www.abilitynet.org.uk and: www.techdis.ac.uk

- A general overview of teaching students with disabilities (including visual impairment) can be found at: http://www.open.ac.uk/inclusiveteaching/ and: http://www.engsc.ac.uk/downloads/resources/disguide2ed.pdf

- Information sheets on teaching students with various impairments: http://www.nottingham.ac.uk/disability/ITS%20leaflets.htm

Contact information

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