

Engineering Subject Centre Guide: **Working with Disabled Students**

Second Edition

June 2005



Authorship

The 1st Edition was called the “LTSN Engineering Guide: Working with Students with Disabilities” and was produced by LTSN Engineering in May 2002, written and edited by

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The Higher Education Academy Engineering Subject Centre (previously LTSN Engineering) has published this 2nd Edition with updates and additional material provided by David Jackson, Disabilities and Additional Needs Service, Loughborough University, and Carol Arlett, Higher Education Academy Engineering Subject Centre.

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Executive Summary

The first edition of this resource guide was commissioned in response to the changes in disability legislation. The Special Educational Needs and Disability Act 2001 (SENDA) amended the DDA and came into force in September 2002. It is now unlawful for a university, or department, to discriminate against a disabled person. It is therefore important to understand the implications of the Act and to develop good practice to ensure that quality engineering education is available to all who can benefit from it.

The Guide proved to be a useful resource for departments, and institutions, in developing a response to SENDA. The feedback was so positive that the Centre decided to produce this second edition. The format has not changed but the text has been updated and new case studies added.

This resource guide will continue to help departments to ensure compliance with the Act. The guide breaks down the terminology used within the Act and discusses how the legislation effects teaching and learning provision. Implications for admissions processes are highlighted and the UCAS disability coding system is explained so that admissions tutors can feel prepared before interviewing candidates.

'Working with Disabled Students' provides an overview of the QAA precepts and covers all aspects of accessibility from the student application process through teaching and learning to evaluation and assessment. It considers provision in terms of the physical environment, including teaching accommodation, as well as access to general support facilities and complaint procedures.

Case studies, written by students and staff, are used to highlight good practice. The guide sets scenario examples to demonstrate the practical implications of the Act on current working practices as well as offering guidance on developing accessible teaching and learning. It places emphasis on planning ahead, making facilities accessible and developing suitable teaching and learning resources that could be of benefit to all students.

The guide is aimed at staff within engineering departments in higher education. Much of its content will be useful to any member of staff, but it is likely to be most relevant to those given particular responsibility for disability issues.

John Dickens
Centre Director, HE Academy Engineering Subject Centre

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1 Introduction

Several strands of current thinking come together to make Working with Disabled Students a particularly important issue for engineering departments.

- Staff and institutions in higher education are committed to providing access to high quality engineering education for all those who can benefit from it.
- Recruitment issues, together with the widening participation agenda, mean that engineering needs to attract and retain all those who can benefit from an engineering education and can then contribute to engineering practice.
- The QAA's Code of Practice on Students with Disabilities provides clear guidance for institutions on ways of ensuring that students with disabilities have access to a learning experience comparable to that of their peers. See...

<http://www.qaa.ac.uk/public/COP/COPswd/contents.htm>

- Recent legislation, in particular the Disability Discrimination Act (1995) and the Special Educational Needs and Disability Act (2001), place statutory duties on departments and institutions to ensure that they do not discriminate against students with disabilities.

It is timely, then, to offer this guidance on Working with Disabled Students. It draws on the experience of engineers, students and staff with disabilities around the country, and it is hoped that it will prompt further exchanges of good practice through the Engineering Subject Centre.

For colleagues seeking additional information on disability-related issues, the Centre's website has links to a number of useful sites. See...

<http://www.engsc.ac.uk/er/dis/>

1.1 How to Use this Guide

This Guide is aimed at staff within engineering departments in higher education. Much of its contents will be useful to any member of staff, but it is likely to be particularly relevant to the needs of Chairs of Departmental Teaching Committees, or those who may have been given a particular responsibility for disability issues.

Staff might use the Guide in three ways:

- To refer to as and when needed, using the contents page as a guide
- By working through it more thoroughly on a section-by-section basis
- As the basis for departmental discussions on developing good practice

Towards the end of the Guide is a series of Checklists and Briefings, and a number of Case Studies. Scattered throughout the text are some Mini Case Studies, and some Scenarios for you to work on.



There are some cross references within the text shown like this.

However you use this Guide, we hope you find it helpful. The Engineering Subject Centre will be very pleased to receive any comments or suggestions for improvement, and in particular to receive and disseminate examples of good practice.

1.2 Acknowledgements

We are very grateful to colleagues in HEI's who have contributed to the development of this Guide through the provision of advice on specific aspects of disability, illustrative case studies and feedback on earlier drafts. Responsibility for any errors or omissions, of course, remains with the Production Team.

The cartoons contained in this publication are copyrighted by their respective authors and therefore should not be used in any printed material, internet website or by any other means, without the consent of the authors or the Greater Manchester Coalition of Disabled People. The cartoons contained in this publication came from the "COALITION" magazine which is published by the Greater Manchester Coalition of Disabled People. If any cartoons have been included in this publication have not acknowledged their author, this will be put right as soon as the author(s) concerned make themselves known to the authors of this publication.

1.3 Terms Used in This Guide

For the purposes of this Guide, the terms 'disabled students' and 'students with disabilities' have been used interchangeably. This reflects practice in the legislation and associated guidance.

In relation to HEIs, there is considerable variety across the sector in the terms that are used to describe departments and services. Most institutions will have some form of central disability support service, but this may be called quite different things in different places. Similarly, institutional structures and terminology vary in relation to faculties, schools, departments, programmes, modules, courses, etc.

We have adopted the following terms in this Guide:

Department	A grouping of staff working in the same area, eg Civil Engineering, Electronic and Electrical Engineering, etc.
Departmental Learning and Teaching Co-ordinator	The member of staff within a department with primary responsibility for the department's teaching. Might be called the Chair of the Departmental Learning and Teaching Committee.
Disability Support Service	A central unit offering support to disabled students.
Educational/Staff Development Unit	A central unit advising staff on learning and teaching issues, as well as other areas.
Faculty	A group of cognate departments, eg the Engineering Faculty.
Personal Tutor	A member of academic staff within the department with some responsibility for the pastoral care of a group of students.
Programme Director	The member of staff responsible for a particular degree

1.4 Production Team

This Guide was commissioned and supported by the Higher Education Academy Engineering Subject Centre and was written and edited by:

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We are grateful to Mike Wray, National Disability Team for his comments.

1.5 Comments and Suggestions

Comments and suggestions concerning the Guide are most welcome and should be sent to:

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2 Quality Assurance Agency – Precepts

These are the Precepts from the QAA's 'Code of Practice for the Assurance of Academic Quality and Standards in Higher Education: Students with Disabilities'.

General Principles

- 1 Institutions should ensure that in all their policies, procedures and activities, including strategic planning and resource allocation, consideration is given to the means of enabling disabled students' participation in all aspects of the academic and social life of the institution.

The Physical Environment

- 2 Institutions should ensure that disabled students can have access to the physical environment in which they will study, learn, live and take part in the social life of their institution.
- 3 Institutions should ensure that facilities and equipment are as accessible as possible to disabled students.

Information for Applicants, Students and Staff

- 4 The institution's publicity, programme details and general information should be accessible to people with disabilities and describe the opportunities for disabled students to participate.

The Selection and Admission of Students

- 5 In selecting students institutions should ensure equitable consideration of all applicants.
- 6 Disabled applicants' support needs should be identified and assessed in an effective and timely way, taking into account the applicant's views.

Enrolment, Registration and Induction of Students

- 7 The arrangements for enrolment, registration and induction of new entrants should accommodate the needs of disabled students.

Learning and Teaching, Including Provision for Research and Other Postgraduate Students

- 8 Programme specifications should include no unnecessary barriers to access by disabled people.
- 9 Academic support services and guidance should be accessible and appropriate to the needs of disabled students.
- 10 The delivery of programmes should take into account the needs of disabled people or, where appropriate, be adapted to accommodate their individual requirements.

- 11 Institutions should ensure that, wherever possible, disabled students have access to academic and vocational placements including field trips and study abroad.
- 12 Disabled research students should receive the support and guidance necessary to secure equal access to research programmes.

Examination, Assessment and Progression

- 13 Assessment and examination policies, practices and procedures should provide disabled students with the same opportunity as their peers to demonstrate the achievement of learning outcomes.
- 14 Where studying is interrupted as a direct result of a disability-related cause, this should not unjustifiably impede a student's subsequent academic progress.

Staff Development

- 15 Induction and other relevant training programmes for all staff should include disability awareness/equality and training in specific services and support.

Access to General Facilities and Support

- 16 Students with disabilities should have access to the full range of support services that are available to their non-disabled peers.

Additional Specialist Support

- 17 Institutions should ensure that there are sufficient designated members of staff with appropriate skills and experience to provide specialist advice and support to disabled applicants and students, and to the staff who work with them.
- 18 Institutions should identify and seek to meet the particular needs of individual disabled students.
- 19 Internal communications systems should ensure that appropriate staff receive information about the particular needs of disabled students in a clear and timely way.
- 20 Institutions should have a clearly defined policy on the confidentiality and disclosure of information relating to a person's disabilities that is communicated to applicants, students and staff.

Complaints

- 21 Institutions should ensure that information about all complaints and appeals policies and procedures is available in accessible formats and communicated to students.
- 22 Institutions should have in place policies and procedures to deal with complaints arising directly or indirectly from a student's disability.

Monitoring and Evaluation

- 23 Institutional information systems should monitor the applications, admissions, academic progress and nature of impairment of disabled students.
- 24 Institutions should operate systems to monitor the effectiveness of provision for students with disabilities, evaluate progress and identify opportunities for enhancement.

3 The Legislative Framework

3.1 Overview

The major pieces of legislation in this area are the Disability Discrimination Act 1995 (DDA) and the Special Educational Needs and Disability Act 2001 (SENDA), which amended the DDA and is also known as the DDA part 4.

SENDA places obligations on HEI's that were previously largely exempted from the DDA. New duties regarding the provision of post-16 education and related services for people with disabilities came into force in September 2002. The duties apply to providers in England, Wales and Scotland. It is therefore very important to understand the legislation and its implications, and to develop good practice in response to it. Note that SENDA does not currently apply to Further and Higher Education Institutions in Northern Ireland.

3.2 The Special Educational Needs and Disability Act 2001

"The principle behind this legislation is that disabled people should have the same opportunities as non-disabled people to benefit wherever possible from whatever education or other related provision is available."

*Disability Rights Commission
Code of Practice (Post 16)
Section 1.2*

3.3 Who Does SENDA Apply To?

SENDA applies to any student or prospective student who is classified as disabled according to the definition in the DDA. This defines a disabled person as someone who has a physical (including sensory) or mental impairment, which has an effect on his or her ability to carry out normal day-to-day activities. The effects of the impairment must be:

- substantial
- adverse
- long term (has lasted, or is likely to last, for at least 12 months or for the rest of the person's life)

Note that dyslexia and long-term medical conditions or illnesses are covered by the Act. Also note that international students studying in this country, as well as students registered on courses in England, Scotland and Wales though studying abroad, are covered by the Act.

3.4 How Does SENDA Affect Your Department?

The Act makes it unlawful for a university, or department within the university, to discriminate against a disabled person

- in admissions
- in the terms on which admission offers are made

- by refusing or deliberately omitting to accept an application for admission
- in the provision of services provided wholly, or mainly, for students. This includes all aspects of teaching and learning (including field trips) and assessment.

3.5 How Can You Ensure Your Department is Compliant with the Act?

Institutions are required to take positive steps to make their education and other related services accessible to disabled students. In particular there is a requirement to be 'anticipatory' with regard to the needs of disabled students. This means that a department or institution should be continually reviewing its policies, procedures and practices to ensure that the needs of a disabled person can be met, if and when they apply.

Examples of this would be to ensure that course materials are in electronic form so that they can be easily transcribed should this be required, and to ensure that web-based materials are accessible to students who use screen readers. Failure to anticipate the needs of a disabled student may damage a defence against any allegations of discrimination.

A department needs to ensure that it has both anticipated the needs of a disabled student and that it has made 'reasonable adjustments' to ensure that a disabled student does not encounter discrimination. Examples of 'reasonable adjustments' would be:

- arranging for book lists to be made available early so that a blind/partially sighted student can have books read to tape (this takes approximately 3 months)
- making alternative assessment arrangements for a deaf student who is a BSL (British Sign Language) user.

Remember that the act applies to individuals and that your response to the needs of individual students should vary according to their particular needs.

As institutions respond to the requirements, identifiable differences may emerge in the quality of the student learning experience for those entering HE after September 2002. In seeking to secure equity and inclusivity in the treatment of all students with disabilities, departments should ensure that changes in practice and provision are applied consistently to all students, including those already registered.

It is important to ensure that information received from a student, or from a university section such as the institution's Disability Support Service, is recorded and acted upon. Such information may be sensitive and Data Protection legislation, of course, applies.

It is probably not sensible for individual academics to become experts on the legislation; there will be people within your institution whose job it is to develop this expertise and to advise you. Departments should, though, consider identifying a member of staff to act as the Departmental Disability Officer.

3.6 Things You Should Know

3.6.1 What is 'discrimination'?

Discrimination is defined by the legislation as:

- When a responsible body (university/academic department) treats a disabled person **less favourably**, for a reason relating to the person's disability, than it treats (or would treat) a person to whom that reason does not, or would not, apply and that treatment cannot be **justified**.
- When a responsible body (university/academic department) fails to make a **reasonable adjustment** when a disabled student is placed, or is likely to be placed, at a **substantial disadvantage** in comparison with a person who is not disabled.

3.6.2 What is 'less favourable' treatment?

Less favourable treatment occurs when a disabled person is treated in a way that disadvantages him/her, for a reason relating to his/her disability, in comparison to how a non-disabled person is or would be treated.

3.6.3 What is 'justifiable'?

Less favourable treatment may be justified only if one of the following conditions is fulfilled:

<ul style="list-style-type: none">• It is necessary to maintain academic standards	<i>These are particularly important where external validating bodies set prescribed criteria for admission to, or assessment of, a particular course. Please note that the exemption of Professional Bodies from the DDA part 4 was removed from September 2004.</i>
<ul style="list-style-type: none">• It is of a prescribed type	
<ul style="list-style-type: none">• It occurs in prescribed circumstances	
<ul style="list-style-type: none">• The reasons are both material to the circumstances of the particular case and substantial	

The onus is on the institution or department to show that the action taken was justified and that the justification would still be valid even after a reasonable adjustment had been made. This makes it important to keep good records.

3.6.4 What is a 'reasonable adjustment'?

'Reasonable' is not clearly defined in the legislation and will become clearer as case law develops. When considering what is reasonable an institution/department should think about such things as:

- The need to maintain academic standards
- The financial resources available to them

- Grants or loans available to the student, eg the Disabled Students' Allowance
- The cost of making a particular change
- The extent to which it is practicable to make a particular change
- The extent to which aids or services will otherwise be provided to disabled people or students
- Health and safety requirements
- The relevant interests of other people including other students

Whilst these considerations are important, they should only be used to justify a decision that can be backed up with sound evidence. The courts have been interpreting the DDA quite robustly and would tend to see universities or colleges as large organisations well able to afford any necessary changes.

There is a clear onus on the institution/department to make reasonable adjustments whenever possible.

3.6.5 What is 'substantial disadvantage'?

When deciding whether a disabled student is placed at a substantial disadvantage by a course of action, the university/department should take account of the time, inconvenience, effort or discomfort entailed by the disabled student in comparison with his/her non-disabled peers.

An example of a student placed at a substantial disadvantage would be where a deaf student, who relies on lip reading, asks a lecturer not to speak to the group when facing the board or OHP screen, but to face the group when speaking, and having this request refused.

3.6.6 What happens if a student complains that he/she has been discriminated against?

A student who raises a complaint against a university or department may bring civil proceedings in the county court to sue for damages or seek conciliation via the Disability Rights Commission. They may pursue both courses of action if they wish. Institutions may want to consider ensuring that their complaints procedure is widely known by students to avoid costly court appearances.

3.6.7 Where can I find further guidance?

The Disability Rights Commission has published a Code of Practice for post-16 education providers, which provides guidance on implementing part 4 of the Disability Discrimination Act. The Code includes further clarification as to what constitutes less favourable treatment, justifiable reasons for it, reasonable adjustments and substantial disadvantage

Scenario 1 – Progressive Impairment

An applicant wishing to study on a four-year degree programme has a progressive impairment which means that they may not even live for the full length of the course.

The physical deterioration in the applicant is likely to be intermittently fast and then fairly slow. There are aspects of the course that the applicant could cope with currently, but might not be able to in a matter of months – for example, drawing with a pencil.

There is no doubt that the applicant has the intellectual ability to follow the degree programme.

How might the applicant's disability influence your decision as to whether to offer them a place?

See page 91 for our comments on this.

3.7 Support

These issues clearly affect all departments within a university and there will typically be a range of central support services able to offer support for students and advice for staff.

These are discussed in more detail later, but the Disability Support Service is likely to be the prime contact, with the Examinations Office having considerable experience in alternative assessment procedures.

3.8 Anticipatory Actions

The legislation places an 'anticipatory' duty on institutions and departments. Essentially this means that you should have made arrangements to ensure that you could provide the following at the time when a student – or prospective student – will need them:

- Materials in Braille/large print/tape/disk/other formats. Typically this means ensuring that they are available (a) electronically and (b) well ahead of the time other students will need them.
- Mobility training for those who will require this. Mobility training would be needed, for instance, by a blind student to help them learn their way around the university.
- BSL interpreters.
- Communication support workers (usually a combined note taker/BSL interpreter.)
- Note-takers in lectures/tutorials.

- Assessment of specific support, equipment and software needs.
- Individual/small group tuition for students who have dyslexia.
- Procedures for representing students' needs to various university departments.
- Adapted accommodation to meet individual needs.
- Carers to meet any personal care needs.
- Support for students who have a mental health problem.
- Alternative examination/assessment arrangements for students who require them.
- Physical access to buildings for students who have mobility needs.

Please note this list is indicative, not exhaustive.

This anticipatory requirement will impact upon the institution at different levels. Many institutions are currently developing new or revised policies and practices in relation to the legislation. Your department will need to conform to these, and be able to demonstrate that it has done so.

Many of these anticipatory actions will already have been addressed by the institutional Disability Support Service and it is important that your department has good links with this service.

Some of them, though, depend critically on departments, for example, being able to provide materials in different formats. If course materials and key textbooks do have to be converted this can take a considerable time – up to 3 months to produce an average textbook. Therefore if a blind student is to start their studies in October, reformatting will need to start as soon as A-level results are known. The university could be taken to court if the student arrived and found that key materials were not available in the necessary format.

The mini case study that follows provides a useful example of how a student's needs were met through anticipatory actions. It should be noted, however, that there might be some situations that are more difficult to address.

Mini Case Study 1 – Anticipatory Actions

Mike is 22. He left school at the age of 19 with 3 good A-levels. Since leaving school, Mike has been going to college to learn about IT. He wants to take the degree course in Mechanical Engineering - he is passionate about racing cars.

Mike has Muscular Dystrophy. He is already unable to walk or stand, and in time, he will lose the use of his arms and hands. He is a full time wheelchair user - getting around in his electric wheelchair.

Mike has accepted an offer made to him from your department twelve months ago. He is due to start his studies in October, it is now May. What will Mike be busy organising for himself and what anticipatory actions does your academic department need to take before the beginning of term?

Mike needs to...

If he hasn't already done so, he will need to arrange for a Needs Assessment to take place under the auspices of his local Social Security office. The Occupational Therapist or Social Worker who carries out the assessment will be trying to find out how much help and support Mike will require through a 24-hour period, so that he can be funded to buy his own personal assistance. Personal assistance may be purchased from an agency such as Community Service Volunteers or from a local provider of medical/support services.

Secondly, there may be academic support needs that Mike will have at University. Examples of this might be:

- providing suitable computer equipment
- arranging for a qualified note taker to take notes for him in lectures, seminars and tutorials.
- considering what support he will need in practical sessions

Mike needs to contact the Student Support Office of his Local Education Authority and make an application for the Disabled Students' Allowance (DSA). The DSA is designed to cover any of the additional costs of studying in Higher Education by a disabled person. The benefit pays for any equipment or human help that is needed in order for the individual to study effectively.

If Mike knows that the DSA will not be enough to enable him to purchase the equipment and other support that he would benefit from having, he needs to begin searching for further funding from various charitable bodies.

The department needs to...

Determine what support they need to provide for Mike to study effectively.

If the degree is validated by a professional body then it will be important to check whether Mike will be able to comply with everything that the body requires. If he won't be able to, then it will be necessary to try to agree alternative arrangements with them. This activity should be carried out by the department before Mike is offered a place to study at the university; if he accepts an offer, and is then unable to fulfil all the requirements of the course, there could be an action for breach of contract.

Mike may already have given details to the university of any examination related support that he will need, if not these need discussing with him. The Department will need to consult any examination and assessment policy concerning disabled students. If Mike is likely to spend significantly more time taking his examinations than his peers,

then there are budgetary issues to consider such as paying invigilators. Secondly, if Mike requires a scribe or amanuensis these will need arranging and he will need to be given time to practise before the actual exam takes place.

3.9 Other relevant legislation

3.9.1 Human Rights Act (2000)

The relevant articles in this act are Article 2: The Right to Education, and Article 14: The Prohibition of Discrimination in the Enjoyment of the Convention Rights. Note that Article 14 is not a right in itself and can only be used in conjunction with one of the other Articles of the Act.

This act currently has no case law with respect to education and it is arguable whether the Right to Education could be applied to Higher Education, as this Article is usually interpreted as meaning statutory, pre-16 education. It is more likely that a complainant would take action under the relevant section of the DDA as this would be more straightforward. Compliance with SENDA would therefore seem to be a good safeguard to legal action.

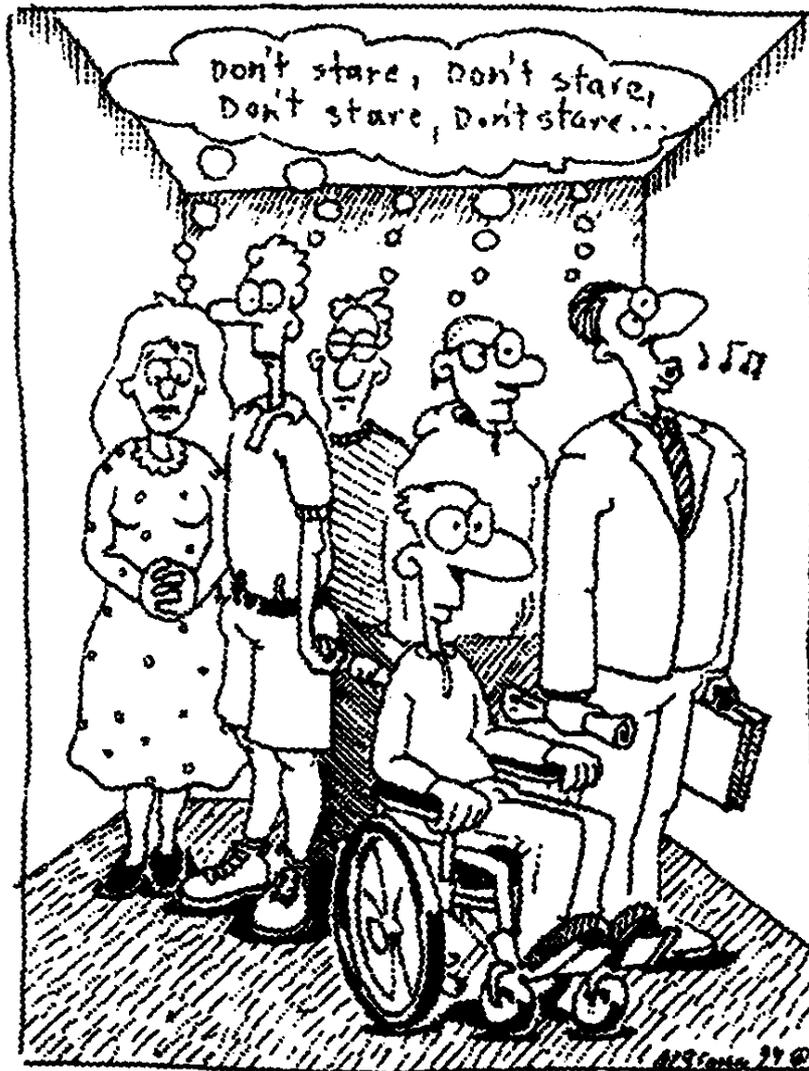
3.9.2 Draft Disability Discrimination Bill

This Bill is currently in the early stages of pre-legislative scrutiny. If enacted it will amend the DDA . The main effects of the Bill with respect to education are a widening of the definition of disability to include HIV, cancer and Multiple Sclerosis from the point of diagnosis, and a requirement for Public Authorities (i.e. HE and FE institutions) to promote disability equality. The latter would be along similar lines to the requirement to promote race equality, as detailed in the Race Relations Amendment Act (2000). In particular the Bill would require HE and FE institutions to have regard to:

- The need to eliminate discrimination and harassment that is unlawful under the Act, and
- The need, where opportunities for disabled persons are not as good as for other persons, to promote equality of opportunity between disabled persons and other persons by improving opportunities for disabled people

(Source: Disability Rights Commission December 2003)

It is likely that guidance and clarification of these amendments would be issued at the time that the Bill becomes law.



"Disability Awareness"

4 What Disability Means

Disabled people in higher education will have had a wide range of experiences. Some of them will have been born with their impairments or medical conditions, others will have acquired them later in life via illness, accidents, or through a range of medical conditions. Some will acquire a disability during the course of their studies.

People with disabilities in higher education will be very different from each other, and will have diverse feelings about themselves and their work.

- A person who has cerebral palsy may well have uncontrollable muscular spasms and incoherent speech - but they will nevertheless have the same intellectual function as any other student taking a course that you might be teaching.
- A student with a spinal cord injury may not be able to participate in the practical sessions that other students undertake; they will find this as frustrating as you do.
- A student heading for a 'first' may persist in asking for extensions for submitting essays etc because they have dyslexia or some other specific learning difficulty; but they will nevertheless need this accommodation to enable them to fulfil their potential.

Such students may see themselves as being disabled people or as having special needs. They may see themselves as having impairments or medical conditions. They may see themselves as being no different from people without disabilities.

Students with disabilities will all be different, but their views of themselves – and their aspirations – will be influenced by their experience. It is helpful, therefore, to have some understanding of how views of disability have changed over time.

4.1 Models of Disability

Over the past twenty years or so, two main models of disability have been used. These have become widely known as:

- the medical (or individual, tragedy or functional) model of disability
- the social model of disability.

4.1.1 Medical model

This model sees a disabled person as having something medically wrong with them that cannot be put right. As the person cannot be cured, it is essentially their own misfortune that they cannot do the same things as people without a disability. To extend the argument, because the disabled person cannot be cured and thus cannot participate in the daily activities of life that other people pursue, it is their problem that they cannot get jobs, get into college or university, or enjoy all the same benefits that their non disabled peers can.

This model may present the disabled person as a victim struggling heroically with their disability. This may encourage others to offer charity, but provides little incentive to do more than this.



The Rev. Dr. A.W. Spooner couldn't understand why his newly-formed charity 'Blind Dogs for the Guide' was failing to capture the public's imagination!

4.1.2 Social model

The social model of disability takes a very different viewpoint. It argues that disabled people are born with or acquire a wide range of impairments or medical conditions. However, because of the way in which society is organised, people with impairments or medical conditions are continuously disadvantaged. The built environment is constructed in such a way that many people with impairments are excluded. Activities or services within those built environments are organised in such a way as to exclude disabled people.

For example, some modes of transport such as buses and trains exclude some people with impairments from using them. Some organisational procedures, including some within higher education, mean that some people with impairments cannot take part in them. In short, the social model of disability argues that people with impairments are often discriminated against – they are disabled by the society within which they live.

The social model therefore makes a clear distinction between impairment and disability.

Impairment is the functional limitation within the individual caused by physical, mental or sensory injury, medical condition, a defect present at birth, or illness.

Disability is the loss or limitation of opportunities to take part in the mainstream of the community on an equal level with others due to physical and social barriers.

4.2 Disability Etiquette

Given these very different models, and the powerful emotions that disability can generate, it is not surprising that disability is often seen as a highly sensitive subject. Sometimes this very sensitivity can lead to a reluctance to discuss issues, and this in itself can be disabling.

Since it is recognised – not least by the legislation – that all disabled people should enjoy the same rights as every other person, the ways in which we communicate with disabled people should be examined. If we don't communicate with a disabled person in the same way in which we would want someone to communicate with us, we are discriminating against that person.

The words that we use are important because they reinforce the beliefs that we hold about other groups of people. Using the 'right' words as far as disabled people are concerned is not political correctness gone crazy, but is an indication of a community's acceptance of – and sensitivity to – all its members.

The word 'handicap', for instance, is offensive to many disabled people. Whilst the word has golfing or racing connotations, for many disabled people it also conjures up a picture of going 'cap in hand' which is linked to begging and charity.

As time passes words change in their meaning; for example, until relatively recently the word 'spastic' was a recognised medical term to describe someone affected by spasms or convulsions. The word gradually changed into being a term of abuse in

the school playground. The recognised term now for someone who might once have been described as being 'spastic' is to say that they have cerebral palsy.

Here are some more words that are largely disliked by disabled people, along with a more acceptable alternative word or phrase.

Do Use...	Do Not Use...
Wheelchair user	Wheelchair bound
Disabled people/people with disabilities	The disabled
A person with Down's Syndrome	Mongol
Person who has/person with...	Victim of...
Disabled person	Invalid
Impairment	Condition
Blind person/deaf person	The blind/deaf
Learning difficulty	Mental handicap
A person with a mental health problem	Mentally ill

DISABLED ETIQUETTE



NMARCUS + SHCHAMBERS

4.2.1 Communicating with disabled people

Basically you communicate with a person who has a disability in same way as you would with a non-disabled person, in fact there's an old joke about this.

Q – What do you say to a blind person?

A – Hello.

However, there are some guidelines that help when communicating with individual's who have particular impairments/disabilities and these are detailed below.

How to communicate with a blind/partially sighted person

You don't need to do anything very special when talking to a blind or visually impaired person. It may be helpful to ensure that they know you are there and to introduce yourself so that they know who is speaking to them.

Out of doors, a blind person may make use of a guide dog and/or a long white cane. A partially sighted person may very often use a shorter white cane, which is called a symbol cane.

If a person is with their guide dog, then the dog will have been very highly trained to lead their owner safely to wherever they might need to go. However, there is no reason why you shouldn't walk up to such a person and ask – at a normal volume level – if they would like any help. If they don't, do not be offended by this and do not make it your life's mission never to offer help ever again.

How to communicate with a deaf/hard of hearing person

Do **not** adopt the approach, 'If in doubt, SHOUT!'

You may need to touch the person gently on the arm to attract their attention, and then speak normally, but make sure that your mouth is not covered in any way and ensure that you face the person to whom you are speaking. If you are speaking to a deaf person in a group try to ensure that only one person at a time speaks so that he/she can more easily follow the thread of the conversation. If the person you are speaking to uses a BSL interpreter it is very important to make sure you speak directly to the deaf person and not to the interpreter.

How to communicate with a wheelchair user

A person who uses a wheelchair will usually be doing so because they are either unable to walk or stand, or because they can only walk for very short distances, or because they can only stand for short periods of time. Therefore, wheelchair users will be either full-time or part-time wheelchair users.

However, whenever a person is using their wheelchair, assuming that you don't know them, there are some important and relevant points to consider when communicating with them.

Never approach the wheelchair user from behind and either slap your hands in greeting on their shoulders and/or shout their name in greeting when they cannot see you.

Don't use the wheelchair user's wheelchair as apparatus or furniture, by either standing on the back of the wheelchair or on any other parts.

Don't invade a wheelchair user's privacy. It is surprising how many people feel that it is acceptable to lean over the wheelchair in such a way that it invades the owner's private space.

In an attempt to get down to the wheelchair user's level, don't stretch your arms along the wheelchair arms in such a way that you end up 'eye balling' the wheelchair user! It is extremely disconcerting.

If you want to offer any assistance or help to a wheelchair user, please remember to ask them first! Whilst this may seem obvious – it isn't to a lot of people. Unfortunately the story isn't apocryphal about the person who saw the wheelchair user pushing themselves along the road near to a crossing. Without asking, they grabbed the wheelchair from behind, pushed it across the main road and ran off smiling at their good deed for the day, leaving the wheelchair user and their young son separated by the road.

Whoever you are speaking to, and whatever their impairment is, it is much better to say something than to say nothing at all for fear of embarrassment or worry about using outdated terminology.

5 Types of Disability

Higher education students with disabilities are categorised according to the UCAS coding system that is used on the first page of the application form. Admissions tutors, in particular, need to be aware that the UCAS disability coding system in use since the 2003 student recruitment session is as follows:

UCAS codes
1. Specific learning difficulty (eg dyslexia)
2. Blind or partially sighted
3. Deaf or hard of hearing
4. Wheelchair or mobility difficulty
5. Autistic spectrum disorder/Asperger's syndrome
6. Mental health difficulty
7. Unseen disability (eg diabetes, epilepsy, heart condition)
8. Two or more of the above
9. Disability, special need or medical condition not listed above
10. None

The descriptors were changed in 2003 to encourage more applicants to declare that they need some specific academic and non-academic support. Prior knowledge of impairments or other special needs will enable the institution's Disability Officer to organise support for the applicant from the moment that they start their studies.

Here are brief descriptions of what the UCAS Codes mean.

5.1 UCAS Code 1 – Specific Learning Difficulty (eg Dyslexia)

- Dyslexia is by far the most common disability in British Higher Education.
- Literacy difficulties can cause great problems for many dyslexic people.
- Difficulties may also be experienced with co-ordination, sequencing, organisation and short term memory.
- Some dyslexic people will have gained good grades in GCSE English Language and/or A-level English Literature.
- Dyslexic students may require help with: note-taking in lectures, revision, planning essays and in expressing clearly what they want to convey in writing to their tutor. They may require extra time in examinations or for completing some assignments.
- Identification is by a qualified person such as a Chartered Educational Psychologist.

Mini Case Study 2 – Dyslexia Support for Engineering Students

Rebecca Bartlett

Learning and Teaching Co-ordinator for the School of Engineering at Liverpool John Moores University

My role is to enhance the profile of learning and teaching within the school. As far as disability goes, I have no special responsibilities beyond those of any other lecturer and personal tutor within the university.

Background

According to the British Dyslexia Association, around 10% of the population have some level of dyslexia, and the severity of problems this causes varies considerably from person to person. The BDA's web site (<http://www.bda-dyslexia.org.uk>) has some useful information for both students and tutors on how to deal with dyslexia in HE. The School of Engineering at LJMU probably have more students with dyslexia than with any other disability, though a lower proportion than might be expected given the proportion of people in the general population with dyslexia. Some studies have reported that people with dyslexia tend to have an enhanced ability to visualise things in three dimensions, which may explain the relatively high numbers going into mechanical engineering in particular.

Provision

Some of our students with dyslexia were assessed at school, and are used to the extra effort and help they need to study effectively. Some are mature students who have only recently discovered that they have dyslexia, and that this is likely to be why they did relatively poorly at school. These students often start on our foundation programme, since they lack both formal qualifications and confidence in their ability to study at degree level. They have generally been working in engineering environments, and are highly motivated to improve their technical knowledge and advance their careers. We also have some students whom we suspect, from the style of their written work, have dyslexia, but when approached are unwilling to investigate.

Potential students who indicate a disability on their UCAS forms are contacted by the central university welfare services to offer help in sorting out what extra support they might need and how they can get it. We also ask students during induction week to tell their personal tutors of any special needs they have though some still slip through the net until well into the year. Students can be assessed for dyslexia if required, and additional support can be obtained, including the Disabled Students' Allowance and extra equipment from their LEA. Many dyslexic students find a personal computer with a spelling checker, a grammar checker, and a printer very useful; some find the tape recording of lectures helpful.

It can be difficult to balance student confidentiality with the need for staff to know about students' disability in order to support them appropriately. Some students will tell all their tutors individually, but we are currently working on a mechanism for all affected tutors to be informed automatically if the student wishes. Welfare services can help liaise between staff and students to ensure appropriate individual support.

The university runs a core training course in disability awareness for all staff. This should ensure that everyone is aware of the likely extra needs of students and staff with various disabilities, as well as how to deal appropriately with people with disabilities. This course is intended to be compulsory for all new staff.

All disabled students may borrow books from the library for longer than usual, which can be particularly useful for students with dyslexia who are typically much slower than average at reading. A free printing and photocopying allowance also help students prepare coursework and notes electronically, allowing them to use a spelling checker before submitting them.

Assessment issues

Students with dyslexia are usually allowed extra time in exams to take account of the time they need to read and write accurately. They may also use a computer to prepare their exam answers. This causes some nervousness amongst staff over the risks of data being accidentally lost, but with multiple and regular backups, there have so far been no problems. Currently the students need to make a fresh application for extra time for every exam period, which seems unnecessarily bureaucratic. A particular problem this causes is that the students tend to forget to apply for this extra time once they have become used to it being allowed. A new student information system should come on line in the near future, which should help a bit with this problem.

It's useful to allow dyslexic students to do their exams in a familiar room separate from the main exam room. While some students might feel stigmatised by this, there are two big advantages: it allows for undisturbed extra time; and a familiar room is useful in itself because some dyslexic students have more trouble navigating and orientating themselves than many other students.

Currently dyslexic students are not allowed extra time for coursework. Although preparing coursework usually takes students with dyslexia considerably longer to prepare than their colleagues, they still have to complete the course in the same time. This means that extended deadlines might be counter-productive.

Issues

Although dyslexia is widely known about, there are still some people who don't believe it exists, including even some current UK teachers appointed to help students with dyslexia! Some students have reported that it is reassuring if tutors take the time to have a quick chat with them about how they can help, and make sure that appropriate allowances are made for things like in-class tests without being nagged about it.

Using good practice in preparing teaching materials for students with dyslexia helps all students. Dyslexic students often have more problems than many students in keeping their work organised, so clearly labelled and organised handouts can be more important for them. Everyone can benefit from using a range of different materials and activities to learn, and potentially from having plenty of time to digest written materials. The Web has the potential to make information available in many forms, which could benefit all learners. However, care needs to be taken to ensure that lectures are not replaced with just text-based information, as this would disadvantage dyslexic students even more than others. The use of colour may cause some problems, as some people with dyslexia find some colour combinations unusually difficult to read, as do other students with some types of vision problems, including but not limited to colour blindness.

As always, there is plenty of room for improvement in the way we support students with dyslexia, but most of these improvements will also be of benefit to the wider student body, made up as it is of individual learners with widely differing characteristics, abilities, and needs.

Mini Case Study 3 – Maths Support for an Engineering Student with Dyslexia

Clare Trott

Mathematics Learning Support Centre at Loughborough University

Background

I work in the Mathematics Learning Support Centre at Loughborough University, and provide maths support for several dyslexic students on a one-to-one basis. Support for dyslexic students is provided in conjunction with the English Language Study Unit and the Disabilities and Additional Needs Service. Stephen had previously spent quite a lot of time working on his study and visual learning strategies, which helped facilitate his maths support.

Nature of the Difficulties

Stephen was a first year Manufacturing Engineering student who is dyslexic. I worked with him for approximately a one-hour session each week, for about ten weeks. Due to his handwriting speed, he experiences difficulty when copying information down in lectures. Consequently, he arrived with hardly any notes. They started with the first example and skipped to the ninth. Dyslexic students often have difficulty with note taking and sometimes use a tape recorder or a note-taker. Stephen was fortunate to be regularly able to get lecture notes from his lecturer. Good quality handouts were very important to him. Long sections of text caused Stephen problems - he frequently got lost half way through, lost his place and failed to keep all the required information in his head. In working through a multi-stage problem he would sometimes become centred on one part, and fail to answer all parts of the problem. Stephen's phonological processing difficulties (problems handling words) make reading rather slow and we

needed to re-read the question frequently, establish that he understood what he was being asked to do, select the most appropriate strategy, go through the problem many times, and check all parts of the question had been completed.

Maths Support Provided

During the sessions I wrote on coloured paper, which suited Stephen better. Many dyslexic students find this helpful. Within a few minutes of starting each session, there would be paper everywhere. It became important to make sure pages were numbered and the questions and examples set out clearly. Stephen finds text-based information difficult to cope with. It is easier for him to learn from a visual source (eg diagrams, charts or graphs) and he thinks in images. Every function we came across, we would sketch, so he could **see** the function. We also tried to organise his work whenever possible, using tables, tree diagrams and spider diagrams. For example, one topic he had much difficulty with was partial differentiation. He got very lost with this, and often omitted some of the derivatives required. We tried to use a kind of tree diagram which, being visual, enabled him to impose an organisation on his work. It seemed to solve the problem. Stephen also found practical problems useful, and frequently needed to relate his maths to an example.

Stephen had problems associating the appropriate symbols with words eg \int and 'integration'. Whenever he saw the sign he knew what to do, but if he just saw or heard the word he was confused and would often differentiate. His short-term memory difficulties mean that he finds strings of verbal instructions difficult to follow. There was a need to match the appropriate symbols with the words. Stephen needed to pause often to take in and process information, and to review work frequently. If we covered too much ground in one session, the overload could result in confusion and no progress would be made.

Conclusion

His anxieties before starting his university course were, in the main, concerning his maths and whether he would cope. The fear of the mathematical demands of the subject affects many dyslexic students. However, with support and encouragement, this can be overcome. Stephen was able to master the demands of the course, and indeed achieved 70% in his end of module exam.

5.1.1 Dyspraxia

- Dyspraxia is an impairment that results in messages from the brain not being properly transmitted to the body.
- Like dyslexia, dyspraxia is described as a specific learning difficulty.
- Dyspraxia often manifests itself with difficulty in making fine motor movements, problems with balance, sequencing, and organisational skills.
- Dyspraxic students may require the same types of support as dyslexic students, occasionally with the addition of physiotherapy.

- Academic members of staff may be able to detect a person's dyspraxia by such things as the use of several styles of handwriting in the course of one essay or assignment, or by an unusual degree of clumsiness.

Scenario 2 – No Room for Disabled Postgrads

During a conversation with their supervisor, a research student lets it be known that they have dyslexia-specific software loaded on their computer because they are dyslexic and dyspraxic.

They are told by their supervisor that postgrad students shouldn't need support like this and that they ought to rethink their career plans.

The student tells you about this.

What is your reaction to this situation – particularly in the light of the Disability Discrimination Act 1995 and the Special Educational Needs and Disability Act 2001?

How would you advise the student?

See page 91 for our comments on this.



See Case Study 1 (page 71) for an example of how an HEI can attempt to meet the specific needs of a student with dyslexia.

5.2 UCAS Code 2 – Blind or Partially Sighted

- There are very few visually impaired/blind people who cannot see anything at all; most can distinguish between light and dark. If sight has been lost gradually, then an appreciation of colour and structure is more likely to remain with the student. Knowledge of this can help when teaching such students.
- Blind and visually impaired students may require significant accommodations to be made for them in terms of their academic work – aids, adaptations, human support, as well as contact with a range of relevant professional people.

- Textbooks, handouts, and exam papers may need to be produced in alternative formats. A standard academic textbook takes about three months to be produced in Braille, or to be read to tape. These essentials must be available for the student exactly when they require them – later on is unacceptable and is probably illegal under SENDA. Students will often receive at least 25% extra time for examinations and may work with a scribe or amanuensis.
 - On arrival at university, many blind and visually impaired people will require mobility training so that they can more easily find their way around those parts of the campus that they need to use most often.
 - A blind or visually impaired student will sometimes require a larger room in their hall of residence than other students, to cope with a large amount of equipment – especially if the student is producing their own Braille. Extra bookshelves will be needed to cope with the many Braille volumes that make up a typical textbook. Hall staff should know which rooms blind or visually impaired students live in for health and safety reasons.
-

Mini Case Study 4 – A Blind Student in Mechanical Engineering

Darren applied to study an engineering degree one year before his proposed course was due to begin. Darren has Marfans Syndrome and is registered blind (he can distinguish between light and dark) and is a part-time wheelchair user (he can walk for a short distance). Darren is a first year student studying Mechanical Engineering.

Once a copy of the UCAS form had been received by the University Disability Service Darren was invited to visit. This was before an offer was made. Darren accepted the invitation and said that he would particularly like to see some suitable accommodation, his proposed academic department, the library, and the students union facilities.

Editor's Note – *It is perfectly acceptable to use the word 'see' in this way with blind people.*

Darren was able to visit suitable accommodation fairly close to his proposed academic department and make arrangements for his post to be placed somewhere accessible for him to pick it up, rather than having to rely on other people to pass him anything placed in his pigeon hole. Darren would require an overhead electric hoist to be installed in his room and in his en-suite bathroom. A representative from the Estates department at the university confirmed that they would be able to install the equipment into the rooms in time for the beginning of term as long as they could start work as soon as the A-level results were known.



As soon as Darren had completed his UCAS form, he contacted his local Social Services Department and requested that he be given a Needs Assessment. The purpose of this assessment was to determine how much personal assistance he needed in a 24-hour period so that funding could be calculated to enable Darren to pay for the support that he would need whilst at university.

Darren uses note takers and adaptive technology for his computer. Parts of textbooks have to be scanned and sent away to be formatted into Braille, and tactile diagrams have to be ordered well in advance. Darren receives extra time for work to be submitted and extra time for exams. He also relies on personal care and assistance in getting around campus.



See Case Studies 2 and 8 (pages 73 and 87) for accounts of the experiences of academic members of staff with a visual impairment.

5.3 UCAS Code 3 – Deaf or Hard of Hearing

- Students who are deaf or have hearing impairments vary considerably in the methods they use to communicate: hearing aids, lip reading, or British Sign Language.
- Students with hearing aids will often benefit from the rooms that they use having a loop system. Alternatively, lecturers may be asked to wear a microphone. Wearing a microphone would be a 'reasonable adjustment'. To refuse to do this would probably be illegal.
- Lip readers are dependent on the speaker facing the audience, standing in a well-lit spot, and keeping their hands away from their mouth. A large beard

or moustache is undoubtedly a very good way of making lip reading much more difficult.

- Many deaf/hearing impaired students will require a note taker in lectures, seminars and tutorials, as well as a scribe or amanuensis for examinations. Extra time is often awarded in examinations for the amount of time spent in passing information to and from the student.
- For some deaf people a teacher of the deaf will be employed to help re-write exam questions – altering the ‘carrier’ language to ask the same question but using simpler language constructions. This method is used primarily for people who have been deaf from birth whose literacy skills have not developed fully. It is important to ensure that the student is being assessed on their subject knowledge, not their grasp of English grammar.
- British Sign Language (BSL) may be used by some deaf students. BSL users tend to be attracted to universities where there is already a signing community.
- BSL users have English as their second language. Their written English may be weak.
- BSL interpreters may need to ask a lecturer to stop periodically during a lecture for a short time, because of the differences between English and BSL.

Mini Case Study 5 – From an Engineering Academic with a Hearing Impairment

John Boyle

Senior Lecturer, School of Engineering and Computer Science at the University of Exeter

I am very aware of some of the problems confronting students with hearing difficulties as I have been using hearing aids for more than twelve years. I know that with hearing aids, I am comfortable in most one to one situations, but that some naturally quiet voices are difficult. Small tutorial groups (up to about 7 people) are possible if they are set in rooms without a lot of background noise and it is agreed that only one person speaks at once. In a class teaching situation, I can manage classes with up to about twenty students, again providing that there is not much background noise; if students ask questions, I can usually see who it is and move up close to them before they repeat the question. Larger teaching groups become very problematic; it becomes almost impossible to get feedback. Likewise the coffee room, bars and restaurants with a lot of people talking or piped music, are places that I avoid, as the feeling of isolation can become overwhelming. Industrial visits can be very difficult because of background noise.

I have no doubt that students with hearing difficulties must feel themselves cut off from many of the social, and some of the work, activities of their peers. There are a series of technological aids which can help, including digital hearing systems, vibrating

alarm clocks, amplifiers for telephones etc. These can be very helpful, and funds to provide them can be obtained through different schemes, but they are all of limited usefulness. Those like myself who cannot interpret travel announcements, hear speakers in large halls, enjoy a drink and a chat except in a quiet pub, depend very much on the understanding and help of colleagues.



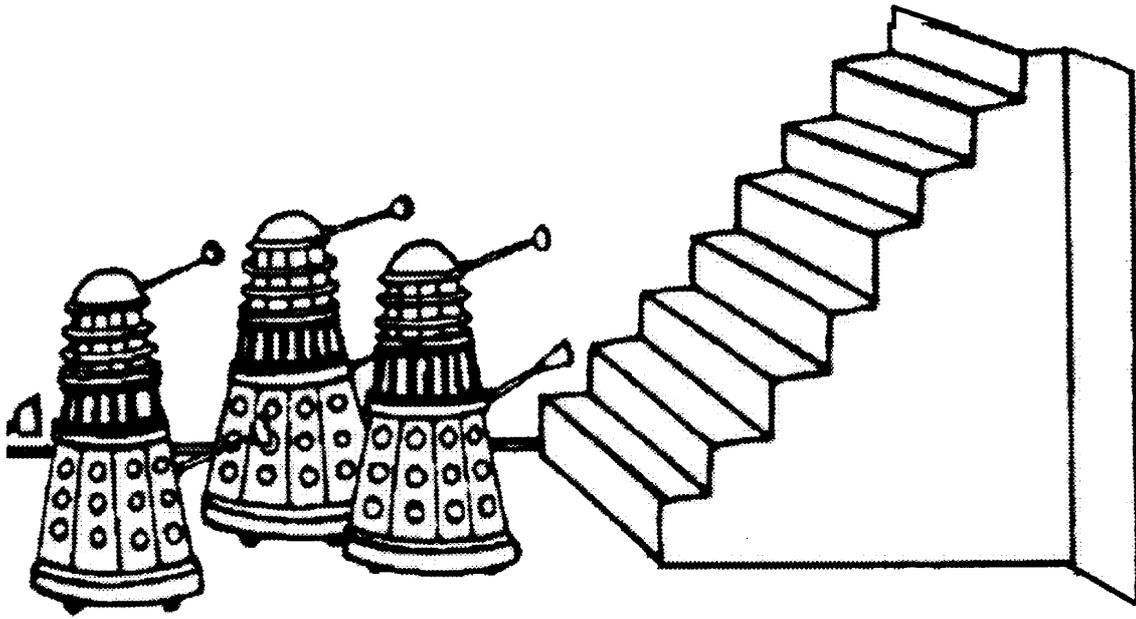
See Case Studies 4 and 6 (page 77 and 82) for personal accounts of the experiences of two deaf/hearing impaired students in HE, and Case Study 5 (page 79) for a lecturer's observations on teaching hearing impaired students.

5.4 UCAS Code 4 – Wheelchair or Mobility Difficulty

- There are very few wheelchair users who cannot stand or walk for a very short distance. Those who cannot will often be paralysed to a greater degree by such things as a spinal cord injury or spina bifida. Full-time wheelchair users often have a difficult time convincing non disabled people that they cannot stand or walk because so many wheelchair users can.
- Refrain from using the term 'wheelchair bound' since it is (a) hardly true and (b) offensive. A more positive term is 'wheelchair user', since the use of a wheelchair allows many disabled people to enjoy greater mobility and more opportunities.
- Whether an applicant is a wheelchair user or walks using various mobility aids, an assessment needs to be made by their prospective academic department concerning what support (if any) the individual may need to complete practical work. An inability to carry out practical work for themselves because of muscular spasms, for example, does not necessarily mean that an individual is unable to follow a particular degree programme. Alternative approaches should be investigated and the Disability Service at any Higher Education Institution will be able to advise on this issue.
- It is recommended that a prospective student who is a wheelchair user or who has mobility difficulties should be invited to visit their prospective academic department before any offer is made to them by the university. Matters to be discussed should include the flexibility in a course programme for any particular areas of difficulty. This is especially important if the syllabus is partially regulated by a professional body/institution. It is not yet clear what would happen if a properly qualified student were rejected by an institution because it could not provide adequate support, or because it was not able to agree a variation with a professional body.
- Many different impairments can result in students being wheelchair users or having mobility difficulties. Further information about a particular impairment can be found from the web sites of various impairment specific organisations, but it is always best to ask the person concerned about how their impairment affects them – as long as this question is asked in relation to an academic issue.



See Case Studies 3 and 7 (pages 75 and 84) for examples of how engineering departments have made provision for students with impaired mobility.



**Well, this certainly scuppers our plans
to conquer the universe!**

5.5 UCAS Code 5 – Autistic Spectrum Disorder/Asperger's Syndrome

- Students using this code will most commonly state that they have Asperger's Syndrome, though other autistic spectrum disorders may also be declared.
- Asperger's Syndrome is part of the autistic spectrum of disorders. Students who have Asperger's will have problems with some, or all, of the following:
 - Social communication: students may find it difficult to understand subtleties of language such as idioms or jokes and will tend to take what is said literally. They may find it difficult, or even impossible, to understand communication based on body language.
 - Social understanding: because of their difficulties in understanding communication, students who have Asperger's may find it difficult to form social relationships and to understand or follow the norms of social behaviour.
 - Engagement: students may find it difficult to empathise with others and to 'see things' from another's point of view. They may also have a deep interest in a particular topic, which may possibly be obscure and obsessive. They may show less motivation for parts of the course in which they have less interest. Students who have Asperger's Syndrome may also like everything in their life to be ordered to the point of becoming anxious if their routine is changed unexpectedly.

- As far as possible try to keep the routine for the student the same. Notify them of impending changes well in advance and, if necessary, go through planned change with them so as to reduce any anxiety.
- Students may find it particularly difficult to participate in group work and a sensitive approach to handling any problems that arise from this type of work needs to be employed.
- Use plain language rather than idiom when explaining topics. Check that the student is clear about what he/she has to do.
- Use detailed, clear instructions. Do not assume that a student who has Asperger's Syndrome will automatically understand what you mean.

5.6 UCAS Code 6 – Mental Health Difficulty

- Of the ten UCAS codes, this code is declared the most infrequently. People with mental health difficulties may be reluctant to disclose via the UCAS code because of concerns about the lack of scope for explanation and definition, and also because of stigma.
- The term 'mental health difficulties' covers long-standing disabilities such as bi-polar disorder, schizophrenia, as well as disabling conditions such as depression and anxiety. Eating disorders, gender identity disorder, and obsessive compulsive disorder (OCD) are also examples of mental health difficulties that might be described through UCAS Code 6.
- Mental health difficulties are covered by the DDA and SENDA.
- Mental health support needs and coping strategies vary from individual to individual and from time to time. Some students may only require support at stressful times, while others may need to know that support is available throughout their course. It is particularly important to consult with each individual – diagnostic labels are not accurate predictors or indicators of support.
- The need for mental health support may not become apparent until a student has already arrived at university; some students may experience mental health difficulties for the first time during their university studies. Research suggests that 1 in 4 people will experience mental health problems at some point in their lives, and many serious mental health difficulties become apparent between the ages of 18 – 25.
- Specialist and therapeutic support for students with mental health difficulties is available through support services such as the Disability Support Service, the Counselling Service, the Mental Health Co-ordinator (if the university employs one), or through Medical Centres and GPs. Most of these sources of support will be able to refer students to specialist external agencies if this is necessary.
- Equally important is the support offered through other routes such as academic departments, student advice services, and halls of residence. Practical support may involve:
 - monitoring absences in a positive way
 - flexible attitudes towards attendance
 - help with motivation and planning

- strategies to cope with stress or anxiety during presentations, placements or examinations
- named regular contacts for more effective liaison and communication (safeguarding confidentiality and addressing the consequences of misconceptions)
- the availability of a quiet space
- peer support
- co-ordinated support during absence from and return to study.

5.7 UCAS Code 7 – Unseen Disability (eg Diabetes, Epilepsy, Heart Condition)

- Unseen disabilities are very difficult for disabled people since they often feel that they are required to ‘prove’ that they have a disability. Some impairments such as diabetes and epilepsy are very well known since they both may result in fits or seizures, but others may not have such visible manifestations – for example pain, head injuries, hydrocephalus, heart and kidney disorders, and blood disorders.
- Many hidden disabilities are classed as ‘disabilities’ under the definition provided by the Disability Discrimination Act (1995). However, if the student requires funding from their local education authority (via the Disabled Students Allowance) for some kind of support of an academic nature, medical evidence will need to be submitted which will usually come from a GP or consultant.
- Many people with hidden disabilities face a lot of prejudice and discrimination because their disability cannot be seen. If a student asks for some special academic accommodation or help or advice, then contact your Disability Support Service for advice on how to respond to such requests for support.
- There are so many different types of hidden disability that it is impossible to list them and their effects. If you feel that you would like to know more about an impairment, please consult the website of a specific impairment organisation, and do not be embarrassed to ask the student themselves – in private.
- Students who have diabetes and epilepsy (or another ‘hidden’ disability) may not want the fact generally known. Personal tutors and programme directors should be informed so that they can understand any support needs and organise any examination accommodations that are required.

5.8 UCAS Code 8 – Two or More of the Above

- A student who has more than one impairment is likely to have greater support needs than someone with a single impairment.
- It is essential that the academic department, student and Disability Support Service liaise very closely to ensure that these needs are met.

5.9 UCAS Code 9 – Disability, Special Need or Medical Condition Not Listed Above

- This code is used by students to declare that they do have a disability but that it is not specified by one of the previous codes.
- Usually students will provide more information on their UCAS form if they use this code.

5.10 UCAS Code 10 – None

- This code is used by students to declare that they do not have a disability.

5.11 Later Declaration

Prospective students may be unhappy about declaring their disability because they think it will affect their chances of being made an offer to study at a particular institution. The legislation is likely to change this over time.

Some students will therefore only declare their disability when they arrive. If the student informs their department of their disability then it is important that:

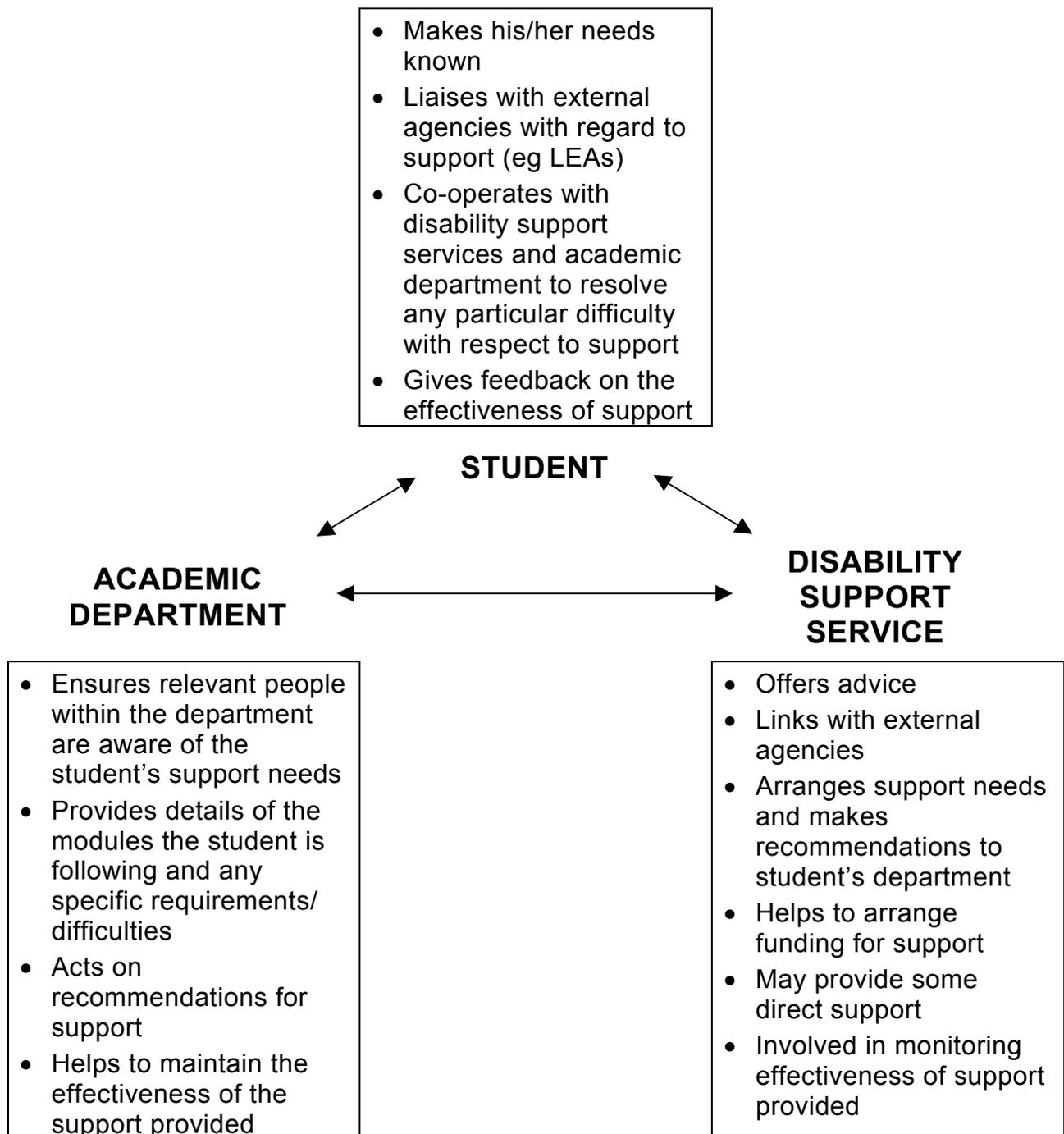
- Time is taken to discuss with the student what adjustments may be needed in the curriculum.
- Relevant staff within the department are told about the student's disability so that they can organise any necessary adjustments. Such disclosure should be discussed with the student.
- The student should be advised to visit the institution's Disability Support Service, if they have not already done so, so that support can be arranged.
- The department contacts the Disability Support Service if it has any concerns about its ability to provide the support the student needs.

6 An Approach to Disability Issues

To ensure that a disabled student receives effective support there must be co-operation and open dialogue between everyone concerned. This usually means:

- The student
- The academic department
- The institutional disability support service

The following diagram illustrates the lines of communication that will normally exist when setting up and maintaining support for an individual student.



Within this tripartite model of support each party will have specific responsibilities. Examples of these are shown in the diagram. It is important that these responsibilities are taken seriously, as each of the parties has specific knowledge and expertise to contribute in ensuring that the support given to the student is effective.

In addition to the student, the department, and the disability support service, there may be several other individuals or agencies involved. The pattern will vary from student to student, depending on the complexity of their support needs. Open and clear communication between all parties, with explicit agreement on exactly who will be responsible for particular actions, is essential.

It is helpful to produce an explicit Student Support Package.

When doing this it is important that a record is made of the support to be provided and the actions to be taken, and that a copy of this is made available to everyone concerned. Clearly the views of the student must be considered with regard to how much personal information is shared with others.

If you are unsure of who your university's disability support co-ordinator is, or what services they offer, it is useful to find out before you need them, so that when the need does arise the support required by an individual student can be put into place as quickly as possible. The earlier that support is arranged in a student's academic career, the more beneficial it will be – once a student falls behind on his/her course due to lack of effective support, it is extremely difficult for them to catch up.

Think of the support process as one of sharing expertise, between you and your department, the student, and the disability support service.

Mini Case Study 6 – The Tri-partite System at Work

Sanjay is a final year mathematical engineering student who has Asperger's Syndrome. This syndrome is an autistic type of disorder that affects the individual's ability to understand the social norms of society, to communicate effectively, to empathise with others and to consider hypothetical situations. In Sanjay's case this has caused him great difficulty in socialising in hall and in making friends, with the result that he sometimes feels very lonely and isolated. He has also had some difficulties in communicating with his academic department, as he tends to take statements literally, when they are not intended that way, which can cause confusion to both parties.

When Sanjay first applied to the university some of these difficulties were anticipated and a meeting was arranged between Sanjay, his father (with Sanjay's approval), his personal tutor, the departmental administrator, and representatives from the local branch of the National Autistic Society (NAS). As a result of this meeting regular ongoing support was purchased (in the form of a support worker) from the NAS, co-ordinated via the Disability Support Service. They also helped Sanjay to apply for Disabled Students' Allowance to pay for this support. Contact was made with Sanjay's

hall warden so that he could ensure that any misunderstandings about Sanjay's behaviour could be dealt with sensitively and sympathetically.

Sanjay's department identified two members of staff whom Sanjay could approach with any concerns, and made arrangements for him to sit his examinations in a separate room from the other candidates (he found large crowds disconcerting). The department also ensured that information on his support needs was passed on to everyone who taught him. Their meeting with Sanjay and the NAS helped to allay some of their concerns.

As Sanjay has settled in to university he has been able to direct the support he receives more effectively and to become more independent. The relationship between the academic department, the disability support service, his hall warden and the NAS has enabled difficulties to be quickly addressed and for anything causing Sanjay concern to be quickly clarified.

Sanjay is expected to graduate this year with a first or upper second.

7 University Services

Often there will be several departments within a university involved in supporting a disabled student. The following is a list of some of the services that may be involved with students in your department, and a description of the role they can play.

Liaison between the student and these services will often be supported by the Disability Support Service, but it may be helpful for you to understand the range of services that may be involved with a single student.

Such services are organised very differently in different universities.

7.1 Examinations Office

The majority of disabled students require some form of alternative assessment procedure to take account of the difficulties they encounter as a result of their disability. The Examinations Office will have considerable experience of what is appropriate for students with different abilities, and will usually be involved in arranging the alternative approaches.

7.2 Residential Organisation/Accommodation Office

Some disabled students (eg those who are blind/partially sighted, deaf/hard of hearing, or who have a physical disability) require adapted living accommodation and/or provision for a personal assistant/carer to live near them. The Residential Organisation or Student Accommodation Office will usually play a key role in these arrangements.

7.3 Estates Organisation

If a student requires some physical adaptation to their living or study environment, the work will usually be undertaken by the Estates Organisation. In response to the new requirements under SENDA, HEFCE have allocated special funding to improve physical access on campuses.

7.4 Disabilities Support Service/Dyslexia Support Service

One or both of these services are invariably involved in co-ordinating or providing direct support to disabled students.

7.5 Library

Some students will require help in using the library effectively and blind/partially sighted students may require relevant course texts to be provided on tape or in Braille. Library staff will usually be able to advise on these matters.

7.6 Computing Services

Technology forms the basis of support to many students. Computing Services staff can be very helpful in ensuring that there is back up if/when this technology goes wrong, or if a student needs training in how to use a particular package. The type of support available from Computing Services will vary from institution to institution, but

even if there is very little support available, students can use funds from their Disabled Students' Allowance to buy in training from external sources for particular software packages. Specific software exists to help students who have dyslexia and students who are blind/partially sighted. Students who have a physical disability may use a combination of adapted hardware and software.

Examples of possible software are:

textHELP! Read+Write	Allows documents to be checked, spell checked, and read back audibly.
Inspiration	Helps students to plan essays.
Dragon Naturally Speaking	Speech recognition software.
IBM ViaVoce	Speech recognition software.
Typing tutors	There are many. Often used by dyslexic students who want to improve their keyboard skills.
Microsoft Office	Often recommended to dyslexic students.

7.7 English Language Support Service

Students with dyslexia, or deaf/hearing impaired students, may find the support of such a unit particularly helpful.

7.8 Maths Learning Centre

Some universities have set up special units to help with maths. They will often already have engineering students as major users and can also provide valuable help for disabled students.



See Mini Case Study 3 (page 28) for a description of how a maths support unit can work with a student with dyslexia.

Scenario 3 – Your Institution's Services

You learn that a dyslexic student is likely to be arriving next year and coming to one of your first year modules. You have not - you think - taught a dyslexic student before.

What services within your institution might be able to help the student - or you?

See page 91 for our comments on this.

8 Administrative Procedures

Efficient administrative procedures within departments are important for several reasons:

- Students with disabilities may well not want to discuss their disability individually with each member of staff with whom they come into contact
 - A consistent approach across the department is helpful for all concerned and can ensure that all staff make the necessary adjustments
 - Departments will need to keep good records so that they can demonstrate compliance with the legislation and code of practice
-

Mini Case Study 7 - Support for Disabled Students from the Perspective of the Departmental Administrator

Kathy White

Senior Executive Officer

Wolfson School of Mechanical and Manufacturing Engineering

Loughborough University

As a Departmental administrator, I have been required to attend a half-day session within the University on Disability Awareness, which included reference to relevant legislation: Health and Safety Acts, Disability Discrimination Act, Protection from Harassment Act, etc. I understand that attendance by administrative staff within departments is actively encouraged, through Heads of Department, by central administration.

The nature of support that may be offered to, or requested by, a student with a disability varies depending on the nature of the impairment and the degree to which this may limit the opportunities that would place them on an equal footing with other students within the department. Therefore, as a departmental administrator, I would make every endeavour to lessen the disability for them by, for example:-

- Making them aware of the Disability Support Service and the facilities, help and support they can offer. I would also liaise with the Disability Support Service myself to make arrangements for note takers, T-loop equipment for partially deaf students, etc.
- Providing students with a copy of the University's "Information for Applicants and Students with Disabilities" and going through this with them.
- Arranging timetables so that lectures are appropriately sited for wheelchair users or students with mobility problems.
- Making lecturers aware of special circumstances where they may need to wear a microphone in lectures, or provide clear copies of notes that they might otherwise expect students to write themselves.

- Providing advisory notes to staff on how to deal with students with particular impairments.
 - Making special arrangements within the department for extra time in examinations, and for special equipment and facilities, such as a computer for a severely dyslexic student, or a writer for those with hand/arm mobility problems or sight difficulties.
-

Mini Case Study 8 - Support for a Blind Student in the Department of Electronic and Electrical Engineering

Julie Marouf

Administrator

Electronic and Electrical Engineering

Loughborough University

We are currently in the position of having one of the few blind students of electronic and electrical engineering in the country. The student is in the first year of a BEng degree and his participation in the programme has made all members of staff in the Department reappraise everything they do.

From an administrative support viewpoint, we have been challenged to review everything, from routine matters such as informing students about room changes to providing assessment facilities and procedures, so that the student would not be disadvantaged. The co-ordination of the Braille of teaching materials has been a major consideration, taking into account the timescales involved in the Braille of equations and tables and the production of raised diagrams. Without heavy reliance on IT it is difficult to envisage how any of this could have been achieved. We use screen reading software, for example, for remote communication via email, assessments, and learning material retrieval. The programme also includes significant use of software packages and programming.

The discipline is a very practical one, involving the students in a number of laboratory experiments throughout their University career, some of which can be intrinsically dangerous. We had to find a means of ensuring that the student had the same learning experience and challenges as sighted students, whilst simultaneously maintaining safe working practices.

We are working to ensure that the future learning experiences of the student are satisfactory without affecting the academic rigour of the course of study.

9 Designing and Delivering Accessible Learning

9.1 Overview

This section looks at the processes of designing and delivering learning in ways that will make it accessible to students with disabilities.

There's actually very little in this section that is specific to students with disabilities – much of what is offered is simply good practice that will benefit all students.

There are three key messages that run through this section:

1. Ask
2. Plan Ahead
3. TINOOW – or There Is Never Only One Way

Ask – This means talking to the student. It's easy to assume that you know what the student needs. You probably don't.

Plan Ahead – Students with disabilities may need things ahead of time, or you may need to allow time for transcription.

TINOOW (There Is Never Only One Way) – Having a range of teaching methods in your repertoire is beneficial to all students, and to students with disabilities in particular.

This section looks at:

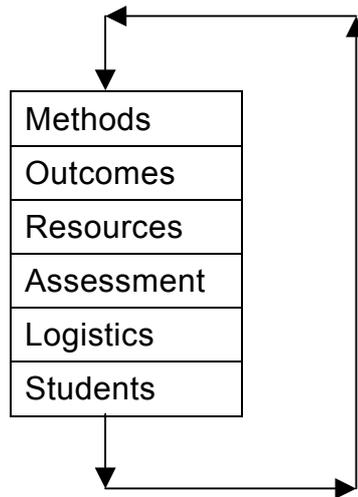
- designing teaching, learning and assessment for students with disabilities
- delivering teaching, learning and assessment for students with disabilities

9.2 Designing Teaching, Learning and Assessment for Students with Disabilities

Here's a simple, iterative model that helps with the design process. It's essentially an exercise in clarifying – and optimising – a number of variables.

It's applicable to the design of any teaching activity; its particular benefit in relation to designing accessible learning is that it encourages the identification of very specific learning outcomes, teaching methods, and assessment techniques. This makes changes more focused – and more limited.

In its simplest form the model looks like this...



...which gives you MORALS if you like mnemonics.

It's an iterative approach.

Start wherever you like, and loop around considering each of the items in turn, until they match. So you end up with a range of **methods** of teaching that will achieve the desired **outcomes** within available **resources**; and your **assessment** techniques will determine whether the objectives have been achieved, the **logistics** hang together, and it all works with the **students** in your particular group.

In the case of students with disabilities this will quickly highlight the fact that certain teaching or assessment methods might not work.

This approach helps the teacher to be more systematic about his or her teaching. It's often helpful to express some of the elements within a matrix like this...

Outcome	Method	Assessment

You specify an outcome in a cell in the left hand column, then choose a method of teaching that will achieve this outcome, and then identify an assessment procedure that will tell you that you have achieved your outcome.

9.2.1 SKUA

It can be helpful to develop the model a little to make it more precise. A good way of doing this is to think about the mnemonic SKUA. (If you have a visual memory, you might want to think about the sea-bird of that name.)



Picture of a Skua

SKUA stands for:

- Skills
- Knowledge
- Understanding
- Attitudes

This highlights the fact that you will use different methods of delivery – and different methods of assessment – for outcomes that are based on skills, knowledge, understanding, or attitudes. Here are some general examples...

Type of outcome	Outcome	Method	Assessment
Skills	Construct a printed circuit board.	Repeated cycle of: demonstrate, set practice work and give feedback.	Examine a completed piece of work.
Knowledge	Know the meaning of the terms used in describing and designing a satellite communication link.	Explain meanings by lecture, handout and directed reading. Class based rehearsal and testing.	Classic written examination or viva.
Under- standing	Carry out the analysis or design of a complete satellite communication link, which is different at least in part from one seen before.	Explain principles and processes by lecture, handout, directed reading and worked examples. Set increasingly complex group exercises and give feedback. Get students to explain principles and processes to each other.	Open note design exercise under exam conditions.
Attitudes	Behave in a professional and ethical manner.	Demonstrate/model by constant personal example. Explain principles through lectures, handouts and directed reading. Group discussion, debate, role-play, etc.	Essay, and observation of behaviour over a period of time, eg in group projects.

9.2.2 Relevance to Students with Disabilities

The big advantage of this approach is that it allows you to look at your teaching at quite a detailed level, and this is usually the level you need to work at with students with disabilities.

You can look at your outcomes in turn, and ask whether your methods of teaching and assessment would be appropriate for a student with a particular disability.

Looking at the items from the previous example...

Type of outcome	Outcome	Method	Assessment
Skills	Construct a printed circuit board.	Repeated cycle of: demonstrate, set practice work and give feedback.	Examine a completed piece of work.

Some students with physical or visual impairments might well not be able to construct a printed circuit board themselves. They could instruct someone else, such as a Personal Assistant, to do it.

This raises interesting issues about what the desired outcome really is. Is it to **design** a pcb – in which case some students could be helped by pcb CAD software – or is it really to **construct** one? This would affect the assessment.

It is important to consider carefully the outcomes you are wanting to assess to ensure they reflect accurately the intended learning. Learning can often be evidenced and assessed in a number of different ways. The outcomes you set for students need to reflect the actual learning sought.

Visually impaired students may be able to use a computer's enlargement capabilities to allow them to see things on-screen, but it can be hard to get an overall view. It is rather like looking at a map through a sheet of paper with a small hole in it.

A blind person who was a Braille user could have a go at achieving this outcome by using German film (this produces raised lines when drawn on) as they could then create the circuit in much the same way as their sighted peers, though it would probably be a more simplistic end result and more difficult to achieve.

They could also have a go at this outcome by using 'real' practical components and a circuit board, but again this would probably be a more simplistic version than could be produced using CAD. Again, a sighted helper would be of assistance.

The current generation of Braille embossers have the ability to produce tactile diagrams quickly and cheaply (and a lot more quietly). This might well be helpful.



Hector realised that there weren't many disabled owners who would have trusted him to do the shopping.

Type of outcome	Outcome	Method	Assessment
Knowledge	Know the meaning of the terms used in describing and designing a satellite communication link.	Explain meanings by lecture, handout and directed reading. Class based rehearsal and testing.	Classic written examination or viva.

This could require tactile diagrams for blind students, and of course the handouts and directed reading would need to be produced in an appropriate form – this can take several weeks depending on the format.

The class based rehearsal and the viva could be quite stressful for some students with disabilities. Students with disabilities will often need more time for written exams and questions may need to be rewritten in more accessible language.

If a dyslexic student was working on this outcome, it would be important that the terms were defined in a very clear and succinct way by the lecturer to minimise any possibility for confusion. Describing how each component links to another, and so on, would help fix the details in the student's mind, as often dyslexic students remember things in this 'connected' way. It would be worth checking that the student was clear about the terms being used. If testing in class, it would be better not to ask students to answer in front of others to avoid putting the dyslexic student on the spot and causing embarrassment. The examination method is fine but the student may require

extra time in written exams; an educational psychologist should be able to advise on this.

Type of outcome	Outcome	Method	Assessment
Understanding	Carry out the analysis or design of a complete satellite communication link, which is different at least in part from one seen before.	Explain principles and processes by lecture, handout, directed reading and worked examples. Set increasingly complex group exercises and give feedback. Get students to explain principles and processes to each other.	Open note design exercise under exam conditions.

Same points as before about materials and exams, except that a student using Braille will need lots of space for their notes.

Group processes may be more complex with a student with a disability and the group may need (a) advice on working effectively with a disabled group member, and (b) more time.

If this outcome was to be achieved by a deaf person, an important consideration - apart from the usual guidelines for good practice (face the class when speaking, etc) - would be how to manage the group work process. Communication is likely to be difficult for an oral deaf student and for a BSL user. In both cases the language they use to describe the principles and processes might be simpler than that used by other students, and there might be some difficulty in the student explaining exactly what he/she means. This would obviously vary from individual to individual but there is likely to be some effect with any deaf student. Again, the usual conventions of taking turns to speak, facing the deaf person, talking to the deaf person and not the interpreter, apply.

The assessment process would be fine, in fact this sort of assessment is likely to be one that presents few difficulties for a deaf student.

Type of outcome	Outcome	Method	Assessment
Attitudes	Behave in a professional and ethical manner.	Demonstrate/model by constant personal example. Explain principles through lectures, handouts and directed reading. Group discussion, debate, role-play, etc.	Essay, and observation of behaviour over a period of time, eg in group projects.

You need to bear in mind that group discussion, debate, role-play, etc may be very demanding for dyslexic students, and that the performance of students with

disabilities in such contexts will be heavily influenced by the behaviour of the other students.

When group activities are involved it can be important to raise the awareness of other group members about disability-related issues. If this is not done, other group members may feel confused or even irritated by adjustments made to meet the needs of students with disabilities. The lecturer's task is to manage the process sensitively in order to accommodate the needs of all students.

This outcome is unlikely to cause many disabled people much difficulty (except of course communication for a deaf person), but it is likely to present problems for individuals with either a mental health problem or an autistic spectrum disorder.

Group discussion, role play and debate might lead the lecturer to assume that these individuals could not achieve this outcome and/or did not understand what was required of them, as these processes focus on areas that will present particular difficulties for these students.

Assessing this outcome in small group tutorials, by individual discussion with the student, and by direct question and answer, might be a way around these difficulties.

For the person who has a mental health problem these difficulties may well be transitory, or fluctuate, and so he/she may be able to participate in larger groups and debate to varying extents throughout the programme (check with the student).

A student with Asperger's will probably always have difficulties with assessment that relies on observing social interaction as this is a defining factor in autistic disorders. With support and clear guidelines the individual is likely to be able to participate to some extent, but is always likely to perform less well in these situations than his/her non-disabled peers.

What often happens with this sort of analysis is that the extent of any necessary changes is found not to be as great as was expected, or that relatively minor changes will be entirely adequate. It's important, though, to engage in a systematic review of this kind, and to consult students on what will be most helpful to them.

9.3 Further Sources of Advice

This topic is getting more and more attention and there is a fair amount of advice and guidance available. Some of this is not specific to engineering, but it can still be very useful. Geographers have addressed the question of taking disabled students on fieldtrips and this can be relevant to civil engineering, surveying, etc. The TechDis website is especially useful on technology and disabilities. See...

<http://www.techdis.ac.uk>

Another example is the Teachability Project, led by the University of Strathclyde in conjunction with four other West of Scotland HEI's. Part of this project involved the production of materials to support academic staff in meeting the learning and teaching needs of students with a wide range of impairments. See...

<http://www.ispn.gcal.ac.uk/teachability>

The Engineering Subject Centre website offers links to these and many other resources.

www.engsc.ac.uk

Scenario 4 – A Deaf Student on a Short Fat Module

You teach a short fat module. It's a week long and it attracts mature students from industry as part of their Continuing Professional Development requirements.

You learn that one of the participants is deaf and works with a BSL interpreter.

What might you do to overcome any problems?

See page 92 for our comments on this.



“According to your bargain basement interpreter, his pants are on fire and it’s snowing in Australia.”

Scenario 5 – Departmental Web Pages

Your department has decided to review its web pages for learning.

What particular issues need to be considered in relation to students with disabilities?

See page 92 for our comments on this.

9.4 Delivering Teaching, Learning and Assessment for Students with Disabilities

The techniques of delivery are clearly important here, but so too is organisation.

Students often rate the organisation of a module or course as a key contributor to its success, and this is even more so for students with disabilities. The more you can do to establish clearly what is going to happen and what the student has to do, the more you will make it possible for students with disabilities to do their best work.

9.4.1 Organisation

The issues here fall into five main categories:

- Negotiation
- Planning
- Adaptability
- Responsibility
- Sustainability

Negotiation

The person who knows most about the student's disability is the student. All too often staff or departments make incorrect assumptions about what the student needs. This is wasted effort for the department, and unhelpful and patronising for the student.

Someone within the department should negotiate with the student about his or her needs. See also Responsibility, below.

Remember, in these negotiations, that students with disabilities cover pretty much the same range as other students in terms of levels of commitment, enthusiasm, intellectual ability, etc.

Planning

Some students with disabilities will need more time to prepare for lectures, labs, etc. They may need to have materials converted into an appropriate form for them.

This means that information and materials will need to be made available earlier than is often the case.

Adaptability

If materials are to be converted into a different format they need to be in a format that is easily transcribed. This typically means having them in electronic form.

This is relatively straightforward for text, although it's a huge help if the documents follow good and consistent word-processing practice. Blind students can access pdf files if they have the latest version of JAWS software and use Acrobat 5.

It's more difficult with graphics and equations. The advice from Disability Support Units is often to try to avoid using diagrams wherever possible, because they are hard to transcribe and difficult to use when they have been enlarged. This is not very helpful in engineering! Our advice would be:

- Talk to the individual student so that you don't waste everyone's time by producing diagrams in an unhelpful format
- Do your best to reduce the number of diagrams to the minimum
- Make use of the latest generation of Braille that can produce tactile diagrams in-house

Ensure that the material is available well in advance of the session to allow time for transcription. Mathematical material often has to be retyped.

Responsibility

It's a big help for the student – and indeed the department – if there is one person who understands the student's needs and has the responsibility to liaise with individual members of staff. This is not to seek to limit individual contact where appropriate, but it can save a lot of duplication and help ensure consistency.

The person who has this responsibility can also help achieve sustainability.

Sustainability

Often there is a commitment in the early stages that fades over time. The department needs to ensure that its support for the student with a disability is sustained over time, and that new staff, or visiting lecturers, are kept informed of the student's needs.

9.4.2 Delivery

Ordinary good practice in training will address many issues to do with the needs of disabled students, for instance:

- having clear outcomes and structures
- ensuring audibility and visibility

- using language that is appropriate to the group
- responding sensitively to participants' needs
- using a wide range of examples
- promoting a positive approach to diversity
- providing the opportunity for feedback both during and after the session

Follow the student's lead on whether or not their needs should be raised with the group.

The student knows best how his or her needs can be met. Stereotyping is unhelpful.

The need to provide materials in a different format may mean that you have to make them available earlier than you are used to.

Here is some advice on how to work with students with particular disabilities. These suggestions are all just detailed extensions of good practice.

Deafness

- Many deaf people supplement their hearing with lip reading; if they don't have a clear view of the speaker's face this can cause problems.
- Ensure you're in a well-lit position without bright areas (such as OHP screens or windows) behind you. In discussion: use suitable seating layouts; make sure that one person talks at a time; and signal where contributions are coming from.
- Repeat questions or comments from the other students.
- The distribution or shuffling of handouts can cause significant background noise; this can make it hard to hear speech...
- ...plan your distribution of handouts to take account of this.

Dyslexia

- Students with dyslexia may find reading aloud extremely challenging.
- Allow choice in such activities.
- Unstructured sessions are often much harder for students with dyslexia to cope with.
- Students with dyslexia may find it hard to follow verbal instructions.
- Repeat and clarify instructions if necessary; provide written instructions for complex tasks.
- Use sans serif fonts (such as Arial and Helvetica) and don't justify text.

Mobility impairment

- Crowded or cluttered training spaces can cause problems for people with impaired mobility.
- Make sure there is adequate circulation space.

Visual impairment

- Their position in relation to visual aids can be very important for a student with visual impairment.
- 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. Allow time for people to absorb what's on the screen.
- For hands-on IT sessions, individual discussions and early availability of materials is particularly important.
- For Braille users allow plenty of time for transcription, and avoid diagrams if possible.

10 Teaching with a Disability

Simon Lewis

Lecturer in the School of Computing and Technology at the University of Derby

10.1 Overview

Most of this package is aimed at helping the student with a disability.

There are, of course, disabled staff as well. This section – written by Simon Lewis, who is a Lecturer in the School of Computing & Technology at the University of Derby – offers a view from that perspective.

In addition to offering useful guidance to teachers with a disability, it also provides a valuable insight into disability itself.

10.2 Perspective

The issue of equality for disabled students is an important one in the current teaching climate. Increased access to Higher Education, and the implementation of the Disability Discrimination Act, are just two factors that have served to heighten our awareness of the needs of disabled students and the specialist support they require. Indeed, much has been written about the delivery of teaching and learning to those with conditions such as visual impairment or hearing loss.

This increased awareness has, for many of us, been of great benefit as we learn to be more inclusive and more understanding of the needs of others. However, much of this work is based on the broad assumption that it is the student who has the disability and that the academic does not. It appears that little work has been done to investigate the teaching experience of academics who themselves have disabilities. In this case study, I intend to highlight a number of the difficulties encountered as a lecturer with a hearing loss, and to discuss some of the planned strategies and methods that have been implemented to reduce these problems.

10.3 Background

The Royal National Institute for Deaf People (RNID) estimate that one in seven of the UK population has a hearing loss of some type. The majority of this group suffer from Presbycusis, the hearing loss associated with old age, where the ear grows less sensitive to high frequency sounds. Many, though, will have become deaf through prenatal infections, trauma during birth, or diseases in early childhood. Indeed, even if the child does not become deaf through infections such as Meningitis, the powerful antibiotics often used in the treatment of such life threatening conditions may well cause it. A small but significant number of people suffer from hereditary deafness.

Deafness is a condition I consider to be woefully misunderstood by the general public. It is relatively easy to mimic blindness and therefore sympathise with those who have impaired vision, but harder to recreate the real effects of deafness. Regarded as 'Children of a Lesser God' in mythology, those who have severe hearing loss are likely to:

- Be incapable of work or unable to progress in their career due to communication problems.
- Attract stares and ridicule from hearing people when using sign language.
- Feel that they are 'forced' to speak, and that without some form of verbal communication they are regarded as slightly less than human.
- Find that modern technology (digital mobile phones etc) is often unusable.

Those who have been educated with other deaf children, who have deaf siblings or parents, and who use sign language, often identify themselves as 'Deaf' ie belonging to the Deaf community. Moreover, such identity is strongly defended; their deafness is not considered to be a disability, but a failure on the hearing person's part for not learning how to communicate with them. Deaf people point out that they have their own history, language and culture – as varied and developed as that of the hearing community. They also assert their right to determine their own lifestyle and future, and are often bitterly opposed to cochlear implants.

If Deaf people have such strong values and social support mechanisms, what of those who do not belong to the Deaf Community, who may have been educated in mainstream schools with no specialist support, or who have lost their hearing later in life? The wide variation in the degree of deafness, and the age at which deafness occurs, mean that it is hard to generalise. Those who became deaf earlier in life, and who are part of the hearing community, often use and benefit from hearing aid technology. Depending upon the age when hearing was lost, skills such as sign language or lip reading may be learned. Those who become deaf later in life may well struggle to learn these skills, and may also find hearing aids to be a poor substitute for the hearing that they have lost. In either case, as these individuals generally belong to 'ordinary' society they often find that:

- society regards deafness as something to joke about
- the outward signs of their hearing loss are mistaken for limited mental ability
- hearing loss makes normal social interaction at parties, pubs or other social events difficult or impossible.
- employment opportunities may be limited to areas where hearing acuity is not a pre-requisite

The reaction to these attitudes does vary, but it is not uncommon for the hard of hearing to avoid 'unnecessary' social contact in order to avoid the embarrassment of misunderstanding what has been said. Furthermore, there is a tendency to cover one's deafness, so as not to draw unnecessary attention. The popularity of 'invisible' in-the-ear type hearing aids is an indication of how sensitive many people are to being identified as deaf.

As one who was born with hearing loss, and who relies upon two hearing aids to provide an acceptable level of hearing, I find myself sensitive to the mistaken views held by society. Although it is tempting to succumb to self pity, at times this misunderstanding has been the very stimulus that has driven me to prove that hearing loss should not be a barrier to academic or career development.

10.4 Disability in Facilitating Teaching and Learning

Given this background it may be understood that the University environment presents a number of challenges and difficulties to those teachers who are hard of hearing.

The move away from a traditional 'chalk and talk' style of teaching to the provision of a range of learning opportunities requires the ability to establish effective two-way communication with students. It is possible to lecture *without* encouraging student response – except perhaps for a cursory 'any questions?' at the end. It may be that teachers who find two-way communication in large rooms difficult, find greater personal security in one sided delivery. However, in recognising the surface approach that traditional lecturing encourages, many teachers now make use of discussions, group activities, brainstorming etc. to bring variety and motivation to the student group. It is these activities – in which the ability to establish an effective dialogue with individuals, groups or the whole class is vital – that may cause problems for the hard of hearing teacher.

A number of guidelines exist to help ensure acceptable acoustics and low background noise levels in school classrooms, and further specifications exist for areas used for teaching deaf people. Sadly, there is little regulation to govern the listening environment of teaching areas in higher education. It is not uncommon for lecture theatres and classrooms to have a poor structural and acoustic design, which leads to poor speech intelligibility. Rooms may have 'dead spots' where it is difficult to hear what is being said, high background noise levels from heating and ventilation systems, suffer from the intrusion of traffic noise or exhibit long reverberation times. In addition to problems with the basic structure and services, noise levels may be significantly increased by the use of overhead projectors, computers and data projectors.

The person with normal hearing may not find poor acoustics or background noise too distracting, as they can generally attend to the source that they wish to listen to. However, hearing aid users receive both the wanted and unwanted signals with little power to discriminate between the two, thus making student comments that much harder to understand. The technology inherent in standard hearing aids is certainly no match for the complex speech processing capabilities of the ear and brain! Moreover, most hearing people can attempt quite accurate source localisation – even if on occasions the wrong source is identified. The hard of hearing person may find it difficult to identify a source to within a few rows in a lecture theatre.

It is this combination of missed or misunderstood comments from students, and difficulty in identifying the person who has spoken, that causes embarrassment and a reliance upon 'cover up' tactics. Some of these tactics – such as identifying participants from their body language or constantly visually scanning the student group – can be successful. Others methods are often used subconsciously, such as extrapolating the meaning of the whole sentence from the few words that have been understood. Unfortunately, those who have high frequency hearing loss find that certain consonants (eg 'f' and 's') are often indistinguishable and therefore interchangeable. It is possible for words to be heard incorrectly or for the extrapolated meaning to bear no relationship to the actual spoken sentence. To the bemused student, this must be akin to a real time version of Chinese Whispers.

Because of these obstacles, formal dialogue can at times be problematic, requiring extra effort on the teacher's part to ensure that the session actually runs to plan.

Another outcome is that the *informal* aural learning environment is often lost. The use of incomplete sentences from multiple participants, which is so characteristic of group conversations, is actually quite hard to follow for hard of hearing people. However, it is often in the times of informal conversation that a rapport is established with students, and opportunities arise to affirm students who may not contribute to larger group sessions. Examples of this include missing comments (thus not exploring a useful line of reasoning) or appearing to ignore student contributions.

Having considered some of the problems that the hard of hearing teacher may encounter, what steps may be taken to minimise these difficulties and to ensure that the student has a positive and motivating learning experience? The bullet points below are a mixture of current practice and strategies that are in the process of being implemented:

10.5 Recommendations

- 1 Establish correct attitudes:
 - Refute the stereotypes often associated with deaf and hard of hearing people.
 - Highlight the fact that deafness can only be partially corrected by hearing aids – they do not confer perfect hearing.
 - Raise awareness of the issues facing deaf people – basic disability awareness should be part of a student's interpersonal skills.
 - Create an 'accepting' environment – there may be those in the class who find it difficult to hear, but who would not 'own up' to this due to peer pressure or fear of misunderstanding
 - Point out the value of good hearing – many students are exposed to high sound pressure levels in places of entertainment and already show the onset of noise induced hearing loss.
- 2 Be honest. The teacher who would rather cover up his or her hearing loss may feel uncomfortable at mentioning this to a class, but an honest approach is likely to defuse potentially embarrassing moments and create an atmosphere where any other communication difficulties can be identified and dealt with. I briefly include the fact that I have a hearing loss within my introductory resume at the start of a module.
- 3 Establish the 'ground rules'. Although seemingly obvious, a system of raising a hand to ask questions or make comments is important and can counteract many of the difficulties and misunderstandings highlighted above. Also, agree to take turns in discussions, to have only one person talking, to speak loudly enough to ensure that everyone can hear individual contributions.
- 4 Take control of the environment. Where possible open only those windows that face away from external noise sources; switch off noisy heating blowers and overhead projectors when not needed. Adjust the room lighting to assist communication.
- 5 Be sensitive in the learning environment. As comments offered by students may not be heard, be aware of the discouragement this may give to shy

students and the lost opportunity to develop student discussion. Encourage nonverbal communication methods, such as students writing down their ideas on a white board.

- 6 Use these principles when working with colleagues, especially in large meetings such as exam boards and committee meetings. Whilst discussing some of these issues with academics and support staff, I have been surprised by how many (with no apparent hearing loss) state that they have experienced difficulties in communication.

In my personal experience, the number of occasions where miscommunication or misunderstanding has occurred have (thankfully) been small. However, many who have, or who are beginning to encounter, hearing loss would be fearful of such situations arising. I trust that in sharing these experiences, others will be empowered to focus less on their hearing loss and more on the goal of facilitating student learning.

Simon Lewis is a Lecturer in the School of Computing & Technology at the University of Derby.

11 Checklists and Briefings

11.1 Good Practice Checklist

1	Is there someone in your department with a specific responsibility for students with disabilities?	
2	Is there a good level of disability awareness amongst staff within your department?	
3	Are administrators, secretaries and technicians given awareness training and kept informed about disabled students in the department?	
4	Is there a departmental policy for conforming to guidance and legislation and for providing evidence to this effect?	
5	Are admissions tutors briefed on good practice in recruiting and selecting students with disabilities?	
6	Are there good links between your department and the relevant university sections (Disability Support Service, Exams Office, etc)?	
7	Are there mechanisms for sharing – and updating – information about the needs of students with disabilities?	
8	Do staff in the department share good practice in teaching your subject to students with disabilities?	
9	Do your departmental materials – including your website – conform to good practice in relation to access by people with disabilities?	
10	Are departmental teaching resources able to be converted easily into different formats?	
10	Is your department as physically accessible as you can make it?	
11	Do senior members of the department model good practice in this area?	
12	Does your department work closely with the student and the Disability Support Service to develop a plan for working with the student?	
13	Have you considered the impact of the legislation on your existing disabled students ?	
14	Have you considered that the legislation may encourage existing students to reveal their disabilities ?	

11.2 Briefing for Admissions Tutors

1	Check to see if the applicant has declared a disability using the codes supplied by UCAS.	
2	If a code has been used and you are unsure whether appropriate support can be provided, or there are elements of the course that look as though they will present particular difficulties to the applicant, contact your institution's Disability Support Service for advice.	
3	Consider whether there are any external accreditation requirements that might present problems for this student.	
4	If it appears that there will be difficulty in meeting the applicant's support needs, it may be a good idea to invite him/her to visit the department so that these needs can be discussed more fully in conjunction with the disability support service.	
5	Remember that it is the institution's responsibility to support disabled students unless this proves impossible for a reason deemed to be justifiable (see Section 3 on the legislative framework), and that it is illegal to refuse to offer a place purely on the grounds of disability.	

11.3 Head of Department Briefing

1	Recruitment issues and widening participation mean that attracting students with disabilities can be a real advantage to a department.
2	Recent legislation – the Disability Discrimination Act (1995) and the Special Educational Needs and Disability Act (2001) – means that we must not discriminate against disabled students.
3	Penalties can be severe and publicity can be damaging.
4	Departments must make ‘ reasonable adjustments ’ to allow disabled students to access our courses.
5	‘ Anticipatory ’ actions are required. You cannot simply wait until a disabled student arrives.
6	Existing students are covered by the Act. They may now have higher expectations of the support they should receive.
7	The requirements of professional bodies can present difficulties, these should be addressed early.
8	Good record keeping is important to ensure that all staff respond appropriately, and to enable the department to demonstrate conformance.
9	Ensuring that teaching materials are in electronic format will be a big help.
10	Institutions are developing procedures. Departments will need to conform to them.
11	Guidance will be available from your institution’s Disability Support Service (or equivalent).
12	Changes in teaching practice are likely to be required.
13	It will probably be sensible to nominate at least one person to act as Departmental Disability Officer .
14	There is already expertise in most departments and certainly in all universities.
15	Web pages should conform to good access standards. Your institutional webmaster will be able to advise.

11.4 Auditing and Diagnostic Tool

The DART (Disabilities: Academic Resource Tool) Auditing and Diagnostic Tool has been designed to assist academics, mainly within Built Environment and Engineering disciplines, to more readily meet the needs of disabled students, and to provide a more accessible curriculum for all. The main feature of this auditing and diagnostic tool is a database that can provide you with bespoke guidance on responding to the needs of disabled students. For more information see: <http://dart.lboro.ac.uk/tool/>

12 Case Studies

Case Study #	Author	Details	Title	Viewpoint
1	Anonymous	Dyslexia Resource Centre	The Experience of a Dyslexic Student in Environmental Engineering	Written by a member of Support Staff
2	Cliff Beevers	Mathematics Department at Heriot-Watt University in Edinburgh	The Experiences of a University Teacher with a Visual Impairment	A staff view
3	John Boyle	Senior Lecturer, School of Engineering and Computer Science at the University of Exeter	Provision for a Wheelchair User Mechanical Engineering Student at the University of Exeter	A staff view
4	Alasdair Pattison	Graduate BEng in Product Design and Manufacture from Loughborough University. Currently working as a Design Engineer with H.R.Adcock	The Experience of a Deaf Student in Product Design and Manufacture	A graduate view
5	Mark Lutman	Institute of Sound and Vibration Research, Faculty of Engineering and Applied Science at the University of Southampton	Adapting to the Needs of Hearing Impaired Students	A staff view
6	Andrew Kay	Graduate BEng (Hons) in Electronic and Electrical Engineering from the University of Strathclyde	The Experience of a Deaf Student in Electronic and Electrical Engineering	A graduate view
7	Chris Swift, Geoffrey Wakeham, Sarah Parsons	Student studying Agricultural Engineering at Harper Adams University College	The Experience of a Wheelchair User Agricultural Engineering Student	Views from a student and staff

8	Marion Hersch, Nina Baker, Metta Macleod	Accessibility of laboratories in the Department of Electronics and Electrical Engineering at the University of Glasgow.	Case study evaluating accessibility and use of a laboratory by a student who uses a wheelchair and a blind member of staff	Views from a student and staff
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1 *The Experience of a Dyslexic Student in Environmental Engineering*

Background

Dominic is a severely dyslexic First Year student (BEng Environmental Engineering) at a traditional city centre university. The university's School of Engineering has an excellent reputation, with six of the eight sections that have been assessed for teaching quality having been awarded a rating of 'excellent'. With about 75 members of staff and 1000 undergraduates, almost every aspect of engineering is covered.

There are approximately 300 dyslexic students at the university: the Dyslexia Resource Centre, which is part of the Student Advisory Service, has two full-time members of academic-related staff, specialist equipment and some study facilities. The School of Engineering is sensitive to the needs of dyslexic students and the Dyslexia Centre has a weekly outreach slot on the Engineering site.

Before University

Dominic was first formally identified as dyslexic at 13 years: this was done privately whilst he was at boarding school, where he received learning support from a specialist teacher. Subsequent tests prior to GCSE, A-level and university entry have confirmed that the effects of his dyslexia have increased in severity.

Support Received at University

Dominic visited the Dyslexia Centre with his mother before making his application, and was in frequent contact during his last summer before coming up to university to ensure that he would have equipment, supplied through the Disabled Students' Allowance (DSA), available from the start of his course.

Dominic is highly 'IT literate' and his LEA agreed to him building his own computer. In addition to a desk-top PC, he has a sub-notebook and a mini-disk player for note-taking and to assist organisation. Current examination arrangements include 25% extra time and the use of an amanuensis. A recommendation for 40% extra time is being considered by the superintendent of examinations.

Other Issues

Dominic is sociable and enjoys university, but the disorganisation of his life extends beyond the state of his student house: in addition he reports that he experiences many difficulties with accessing the curriculum. He does not find *understanding* the course difficult, but rather *proving* that he understands it via exams and written work. Fortunately, Dominic can manage without having to undertake paid work in term-time, a particular concern for those advising dyslexic students who need to spend much more time studying than their non-dyslexic peers.

What Dominic finds most difficult is the style of teaching at university, "...the whole way in which information is presented, including most hand-outs." He would like better, more detailed lectures and definitely smaller teaching groups. Dominic finds it frustrating that most lecturers just state the facts and don't explain why. Increasingly, lecturers are making their notes available on the intranet, but availability is not the issue for Dominic: it is the lack of detail. One lecturer is singled

out for praise for the quality of his notes and the completeness of the information he has posted on the web, including seminar notes and sample answers to examination questions.

Dominic is very disorganised and has a “really bad short-term memory”; he uses his sub-notebook as an electronic organiser, but forgets to look at it and “can’t remember what I am supposed to be doing.” He finds the Engineering building confusing, especially the room numbering system, and frequently turns up at the correct room number, but on the wrong floor, or vice versa.

Some dyslexic students find it easier to express themselves verbally than in writing. Dominic does not find this to be the case: he finds it hard to speak in front of large groups as he frequently mispronounces words. He is inhibited from asking questions and from answering them in seminars and, despite preparing conscientiously, he “hates” oral presentations.

Other Ways of Making Life Easier

The glasses with coloured lenses that Dominic has been prescribed alleviate the physical discomfort that he experiences whilst reading, but do not solve the problem of understanding. In order to understand and retain information, he needs to read text several times, preferably aloud. He uses text-to-voice software to read information from the internet: overall, he finds it extremely difficult to keep up with the reading requirements of his course. In examinations he finds the style in which the questions are written unhelpful, and says that he cannot equate the wording of the question to his knowledge of the subject. Occasionally the amanuensis has to re-phrase the question.

Dominic uses a computer for all writing activities - apart from examinations when he has an amanuensis. During lectures he types rough notes as well as recording. Subsequently, he supplements this information by making notes from textbooks. The writing-up of lab sessions can pose problems for dyslexic students, because of the requirement to enter data directly into the lab notebook and to hand the notebook in for correction within an hour of the end of the session. Dominic’s lecturers agreed that he should be allowed to type up the information and attach the printed page to his notebook: however, some lecturers just correct the work directly from the screen, thus simplifying the process. Dominic uses mind-maps and bullet points to order his information for written assignments, and for examination answers, before dictating to his amanuensis. He finds it difficult to translate from this stage of visual planning to sentences, both in the spoken and written form. He finds it especially difficult to learn to spell technical terms and the more complex vocabulary required for writing at this level, and feels that his spoken vocabulary needs to be wider.

Although extra tuition has been arranged through the Dyslexia Centre, at his request, Dominic finds it difficult to remember appointments. Certainly accessing help is not so easy on a large city centre campus as in a school, where a good learning support unit is embedded in the provision, and the organisational difficulties often experienced by dyslexic students can be severely tried. The transition from a supportive environment where someone else is doing the remembering, to the expectation that organisation of life and study is the student’s responsibility, can be challenging for dyslexic students.

2 The Experiences of a University Teacher with a Visual Impairment

Cliff Beevers

Mathematics Department at Heriot-Watt University in 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 can take a number of forms with a range of severity usually dependent on age. Most of those affected are spotted in their teens or twenties, with the prognosis that although sight loss may be gradual it will be inevitable. The deterioration rate depends on a variety of factors. RP is a disease of the retina in which either the light sensitive rod or cone cells, or both, gradually die. In the former case, rod cell death leaves the individual seeing as if 'down a tunnel', hence the name 'tunnel vision' which is a common name for Retinitis Pigmentosa. RP is also applied to the case when cone cells die in the centre of the macula, which makes reading in diminished light difficult, recognition of faces impossible and the detection of colour unlikely. 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.

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.

Personal goals

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).

3 Provision for a Wheelchair User Mechanical Engineering Student at the University of Exeter

John Boyle

Senior Lecturer, School of Engineering and Computer Science at the University of Exeter

Introduction

I am a Senior Lecturer in Engineering at the University of Exeter. I joined the Chemical Engineering Department in 1967 after seven years working in the chemical industry. For some years, I had primary responsibility for the running of the Engineering Building, including issues such as safety, furniture provision, space allocation, security and building development. When, one August, we knew that Mike (the name has been changed to protect identity), a wheelchair-using, mature student, had been accepted for a place on our four year Master of Engineering degree, I was asked to consider what alterations we needed to make to the building so that Mike could manage our course, and to arrange to get these done.

Engineering Department at Exeter

The Engineering Building is built onto the side of a hill; the front block of the building on the south side, which contains staff offices and teaching rooms, is four storeys high. The main entrance to the foyer on the lower ground floor of this block is from the road below the building, up three flights of broad, concrete external steps. From the foyer, there are twelve steps down to the entrance of a tiered lecture theatre which is used for most first and second year lectures. The main staircase leads up from the foyer to the three upper levels; the lower two give access to teaching rooms, the computer suite and the library; staff offices are on the top floor. At the eastern end of the south block, furthest from the foyer, there is another staircase and a passenger lift giving access from the lower ground floor to each of the upper levels. Corridors on each level link each end of the building. The staff car park is at the side of the building up the hill, and a door from this gives access to the upper ground floor, one level above the foyer. The building was designed and erected in the 1960s with no provision for a wheelchair user.

Provision for Mike

No one in the University admitted to experience of modifying facilities for wheelchair-using students, so we had to start from scratch. Fortunately, practically all the engineering teaching would be done in the engineering building. Access by wheelchair into the building from the pavements at the front would have been very difficult. Because Mike would drive in daily, we designated a parking spot on the staff parking area close to the building entrance, with one side of the spot opening onto an unrestricted space so that Mike would be able to get out of his car with the wheelchair. The thirty yards from there to the back door was level. The back door was up a single step; this step was modified to a concrete ramp set at a gentle angle. We installed a chair-lift to take him down the stairs to the main lecture theatre, where there was a suitable space at the back for him to sit in the wheelchair. He could reach other lecture theatres and laboratories via level corridors (with lots of double doors) using the lift to change levels. The student common room was half way up one flight of the main stairs, and we could think of no way of giving him easy access;

his friends solved the problem by lifting him to it when he wanted. On the upper ground floor, which seemed likely to be most convenient for him, we converted a rest room into a WC for use by Mike and other disabled people. Elsewhere in the University there were problems: kerbs, a couple of steps up here, another three steps down there, would make access to some buildings difficult for him. However, there were few occasions when he needed to move away from the Engineering Building. Finance for the building alterations came partly from a central university fund set up to cover access for people with disabilities.

Lessons Learnt

Before Mike came, I was concerned about how he would manage all the double doors, particularly when they opened towards him. I need not have worried; he was very adept at going through doors from both directions. Where we did have a real problem was the access from the foyer down to the main lecture theatre. We had installed a chair-lift. This was a chair attached to a monorail on the wall. It worked very well, but Mike found that he had to get out of his wheelchair and onto the chair of the chair-lift. He could descend, but someone else had to move his wheel-chair up or down the stairs to follow him, and he would then transfer back onto it. In practice, he had two large friends who would carry him in his wheelchair between them up and down when he needed it. I now know that we should have arranged for a platform system to be installed. We found that Mike managed his laboratory work without major difficulties; in the mechanical workshops technical staff constructed a special ramped platform which allowed him to use the controls on lathes etc, and a low bench which allowed him to work on his project. He graduated well and we last heard that he was working with an aerospace engineering company.

Safety Issues

We had a particular concern about the problem of getting him out of the building safely in the event of a fire. Our building rules say that in the event of a fire alarm, everyone must leave the building by the nearest possible exit and that the lift should not be used. The building committee considered this carefully and decided that Mike should be allowed to use the lift if there were not two strong friends to carry him down, and if the location of the fire allowed it. Our stairs are broad, but we were concerned that his presence could slow any evacuation. Subsequently, in discussions with a disability adviser, we were advised that special wheelchairs could be used on the stairs. I now know that it would be best to contact the Department of Employment to get advice about this and similar matters. Since he graduated five years ago, we have not had any other wheelchair user students studying engineering, but the facilities are still in place. We have had students from the Students' Guild checking on the facilities for disabled people as part of a University wide survey.

Reflection

As tutors, we must recognise that all students with disabilities may need extra support. As teachers, we must recognise that we may have to adjust our delivery or provide special learning aids for them. When we consider the physical environment for disabled people, we must be aware that there may be means to make the physical environment tolerable, for instance by providing access for the physically impaired. We must recognise that students with disabilities of all kinds will have

already overcome many problems at school or college before they were admitted to our courses.

4 The Experience of a Deaf Student in Product Design and Manufacture

Alasdair Pattison

Graduate BEng in Product Design and Manufacture from Loughborough University. Currently working as a Design Engineer with H.R.Adcock.

Background

I have been profoundly deaf since birth. From age five, I attended a special school for hearing-impaired children that had an aural tradition of using lip-reading and hearing aids with no signing. The use of hearing aids helped us to use our residual hearing, so I learnt to speak and lip-read but not sign. This form of education means that I am able to speak to hearing people without much difficulty. After leaving school at age 16, I was confident enough to go onto further education and take a BTEC National in General Engineering. This in turn led to a BEng in Product Design and Manufacture from Loughborough University. I undertook various engineering work experience placements while undertaking my degree, and now work as a Design Engineer with H.R.Adcock.

Support Provided at University

I found a different type of education at university compared to school and college, and this posed some difficulties. For example, at college, the lecturers gave full lectures on each topic of the course, followed by worked examples explained in the lecture. At university, the lecturers gave the students straightforward lectures and expected the rest of the work – examples and exercises – to be understood and completed outside of lecture hours. Another difference was the class sizes – the college had fewer than 20 students per class, the university over 50. This put a great deal of pressure on me as I had been used to a more structured and supportive form of study. During lectures, I carried radio-aid equipment and the lecturer wore a microphone. This gave me independence, and meant I could sit anywhere in the lecture theatre while still hearing the lecturer as clearly as if I was at the front. As I had no problem in communicating with lecturers or other students, I had no special requirements in labs or workshops.

In my second year, the curriculum content was huge and I found that the lecturers moved through it very quickly. Tutorials were provided, but I found these ineffective due to the large class size (over 50 students) and the consequent lack of individual attention. I had hoped to achieve a higher end result than in my first year, but unfortunately was not able to complete all the exam questions in time this year. This was due to the language problems commonly experienced by deaf people. After this experience, I requested additional time for exams and was awarded an extra 15 minutes to an hour for my finals.

In the final year, I also requested additional support with my English grammar in essay writing assessments, which helped to significantly improve my marks in this area. A PhD researcher helped me with the English grammar, for a fee, which was paid for by my County Council under 'Maintenance Grant'. The grant had also contributed to a personal computer in my first year to assist me with written reports

and essays. A 'special-needs' support department within the University helped me to gain the maintenance grant. With this additional support, and the extra time allowance provided for exams, I was able to complete most questions in my finals and was pleased to achieve an upper second-class degree.

Life After University

Job hunting on graduation proved to be a difficult task. Five months of searching resulted in only a couple of interviews, and I eventually took up temporary work assembling microwaves. I finally successfully applied for a position with Loughborough University and H.R.Adcock as a TCS (Teaching Company Scheme) associate. In this role, you spend two years working in collaboration with a university and a local company. This type of employment helped my transition from academia to industry, and gave me excellent experience and challenges in designing and building new assembly machines for a company that had no prior experience in product assembly. I highly recommend this career path for any graduate who seeks support for their first few years of employment. This small to medium sized company had no previous experience of employing disabled people, but provided good support in areas such as deaf awareness attitude and a text-phone. Deaf awareness attitude is more easily generated in a company with few employees. We had only 50 compared with 15,000 in Rolls-Royce plc, one of my work placements during the degree course.

I was pleased when, at the end of the TCS scheme, H.R.Adcock offered me a permanent position as a Design Engineer. My main job role is to design, develop and build assembly machines in-house. Other tasks include assembly machine maintenance and project team-leader. Being a team leader does not cause me any major problems.

Other Issues

My 'social' skills outside the engineering environment have always been lacking. These are continually improving with practice and experience. For example, hearing people's jokes are difficult for me to grasp, in comparison with deaf people's using signing, body language and facial expressions. On the other hand, my 'engineering' skills have allowed me to overcome one minor problem, which other deaf people may initially have in the engineering environment, such as common language in communication.

I am fortunate that my ability to be able to speak and lip-read very well has helped me to accomplish the path from school to current employment, which I enjoy very much.

5 Adapting to the Needs of Hearing Impaired Students

Mark Lutman

Institute of Sound and Vibration Research, Faculty of Engineering and Applied Science at the University of Southampton

Background

I teach students in Audiology at Masters level at the Institute of Sound and Vibration Research, which is within the Faculty of Engineering and Applied Science at the University of Southampton. While this subject has only marginal associations with engineering, the lessons I have learnt from teaching hearing-impaired students would apply equally to regular engineering students at both undergraduate and postgraduate levels. I studied Engineering Science myself some years ago and at that time I had little awareness of the particular difficulties and needs of people with hearing impairments.

It is easy to understand why students with hearing impairments are attracted to audiology. They are able to demonstrate empathy for prospective patients and they wish to help people with a similar condition. However, hearing impairment is a common disorder in the general population. Approximately one in seven adults has a great difficulty understanding conversation in a background of noise. This problem is greater in older people, but there is a substantial proportion of young adults who also have difficulties. Therefore, any lecturer can expect to teach one or more hearing-impaired students at some time. This will be particularly so in programmes that have a preponderance of mature students.

The most common forms of hearing impairment affect the inner ear, which is the organ responsible for transducing vibrations that pass through the middle ear into electrical impulses that travel, via the auditory nerve, to the brain. The inner ear also acts as a frequency analyser and a non-linear amplifier. When the inner ear is damaged, the frequency analysis and amplification properties are degraded. The consequences for everyday living are that speech becomes muffled and easily masked by ambient sounds, such as other people talking. It is a common mistake to think that sounds just become quieter. The non-linear behaviour of the inner ear amplifier mean that many everyday sounds are virtually as loud to the impaired ear as they are to the normal ear.

The usual form of treatment is an amplifying hearing aid. For reasons outlined above, it can be understood that a hearing aid is not a complete solution. It cannot make speech clearer, and there is a tendency for loud sounds to be too loud when amplified. Some people have such a profound hearing impairment that hearing aids are of little benefit. They may be helped by a cochlear implant, which is an electronic device that substitutes the transduction process of the inner ear by performing a frequency analysis of incoming sound and stimulating the auditory nerve directly. Cochlear implants do not restore normal hearing, but are a substantial help to those who cannot hear otherwise.

Some profoundly deaf people communicate using sign language instead of spoken language. Others may supplement spoken communication with sign language, when mixing with others who can sign. However, virtually all people with hearing

impairments make use of lip reading cues, as do normal listeners. It is a common mistake to think that lip reading can form the basis for satisfactory communication. There are many speech features that are impossible to differentiate visually, even by the most skilled. Nonetheless, speech sounds that are most difficult to differentiate from lip reading are often easiest to differentiate acoustically. Therefore, lip reading forms a vital supplement to listening for people with hearing aids and cochlear implants.

Personal Experiences

In a typical class of 18 students I teach, there will be one with a severe hearing impairment who is reliant on hearing aids or a cochlear implant. It has been necessary to make certain adaptations to the teaching environment, and to teaching practice, to ensure that these students are fully included. A mixture of technical and personal adaptations is usually required. Only minor alterations to the curriculum have occurred.

Technical adaptations have concentrated on the main teaching room that is used. Firstly, it was necessary to ensure that all teaching sessions could be timetabled in the same room. Funding was secured from the university to improve the teaching environment: double glazing to exclude external sound, absorbent false ceiling to reduce reverberation (the room was already carpeted), air conditioning to avoid the need to open windows, radio and other microphones feeding into special sound system (with outputs for induction loop and FM signals to feed hearing aids directly), and spotlights to highlight the lecturer's face for lip reading. A particular difficulty had previously occurred with group discussions and seminars. Room microphones were connected to the sound system, which could operate in lecture or seminar mode. The sound system was designed and fitted by the Royal National Institute for Deaf People (RNID).

Use of these facilities has required some discipline. All lecturers and visiting speakers are required to wear the radio microphone, and to ensure that it is working effectively. They are requested to always face the audience and to stop talking if they turn away to write on the boards. They should not cover their face while speaking (and preferably shave off any beard). They are asked to either repeat any questions from the audience, or to ensure that they have been understood. In general this discipline has been followed well, with a few lapses. Students with hearing impairment are encouraged to assert themselves and to point out when they are having difficulties.

In addition to the above technical adaptations, lecturers have been required to modify their teaching slightly. Lecture notes given out at the start of each module should highlight jargon and technical terms that might be difficult to unravel by listening only. All lecturers are required to provide handouts of all slides or overhead transparencies one week in advance to any hearing impaired students. Lecturers are encouraged to deliver material in a simple and direct way, avoiding asides and puns that may be amusing to the majority, but which may exclude students with hearing impairment. All staff who may come into contact with students, including secretaries, attend a workshop designed to increase awareness of problems experienced by people with hearing difficulties.

A very small part of the curriculum is inaccessible to hearing-impaired students. Certain practical skills involve being able to hear or identify quiet sounds accurately. The students are allowed to modify their practice by getting another person to listen for them under direction. The assessment is modified accordingly. Other modifications to assessment recognise that reading and comprehension skills are often slower and less developed in those who cannot access spoken language readily. Additional time is allowed in examinations and allowances are made for imperfect spelling or grammar.

The university Disability Co-ordinator has been extremely helpful to students with hearing impairment, by assisting them in making claims for finances to purchase additional equipment or services. These have included FM radio systems and the time of a note-taker to sit beside the student in all lectures.

Practical work and group work entail less controlled situations that may pose particular difficulties. My experience has been that other students are accommodating during group assignments, and that experienced clinical teachers can ensure that practical work with patients is steered along the right lines. Students with hearing impairment have been able to give presentations to their peers without modifying the curriculum. However, one area that continues to cause problems involves group discussions or case presentations in class. Students need to be reminded repeatedly to speak one at a time, to identify themselves before speaking and to speak clearly and at an appropriate pace. This requires constant vigilance by teaching staff.

Conclusion

Students with even severe hearing impairments can access the curriculum with only minor modification, provided there is a systematic and concerted effort by all teaching staff to adhere to a few common-sense rules. Awareness of the difficulties of people with hearing problems can be conveyed to teaching staff in a workshop lasting a few hours, and is worthwhile for most departments. There are probably some students with undisclosed hearing difficulties in every faculty.

6 The Experience of a Deaf Student in Electronic and Electrical Engineering

Andrew Kay

Graduate BEng (Hons) in Electronic and Electrical Engineering from the University of Strathclyde

Background

I'm now 28 and have been profoundly deaf since being a toddler. I graduated with a BEng (Hons.) in Electronic & Electrical Engineering from the University of Strathclyde, Glasgow in 2000.

I chose the degree because of my interest in technology, applied physics and power engineering. During the course, I particularly liked problem solving and all aspects of project work. Overall, I enjoyed the course and, additionally, the other social aspects offered at University.

Although I had a special needs requirement – a sign language interpreter for lectures and sometimes tutorials and laboratories – I didn't feel that I was different to other hearing students and therefore liked to be treated equally. I was able to integrate as well with my class as hearing students did because we were all studying the same course. I was not treated more or less favourably than others.

Support Provided at University

As well as my sign language interpreter, the University assigned me a special needs advisor from the Special Needs Service, and an academic counsellor from the Department of Electronic & Electrical Engineering. Both were very helpful and provided good support if I had any problems with my course or laboratory sessions. This gave me a feedback route for situations where I felt I had performed badly because I had not been able to adequately understand the required task.

The presence of my sign language interpreter, coupled with being given copies of all the lectures notes in advance, meant that I did not experience anything too difficult in the classroom or lecture theatre. These two methods of support made a particular difference to my degree experience.

Successful communication with both lecturers and students is key to a happy, successful undergraduate experience. I could communicate either via the interpreter, or, if not there, with paper and pen (I can't lip-read). The extra challenges this created were well worth overcoming! I made good friendships with my class and also socialised with them outside the engineering department.

During the latter years of the degree, I was impressed at the individual support and encouragement I received from lecturers such as my project supervisor.

Things that Could Have Been Done Better

Although overall I had a good experience as a deaf engineering student, there were obviously areas where there could have been improvements. For example, extra time in exams and assessments would have been very easy to organise and also very

helpful to me – I felt my grades suffered as a result of not having this facility. Good writing skills are harder to master for deaf people, and the extra time would have helped me to complete exams on time.

The main negative area was not being able to afford an interpreter for all my timetabled work because the Disabled Students' Allowance (DSA) did not stretch to it. This meant that I often did not have an interpreter for tutorials and laboratories and therefore communicated with lecturers and students by paper and pen. Sometimes I found an experiment (for example, individual exercises in the computer laboratory) very difficult to work by myself. In the relatively unstructured laboratory environment, lecturers were often unaware of my special needs. In particular, communication proved very difficult compared to the structured environment of a lecture theatre and, as a result, I was often unable to satisfactorily understand the task in hand.

During the course, encouraged and supported by lecturers, I tried to find summer work placements. I failed to get a placement and feel that this was because I was treated less favourably than students without disabilities. For example, in December 1998 I had an interview for a summer 1999 placement with a major petroleum company. I had to arrange an interpreter for the interview myself and the interviewer did not seem to know that I was deaf, even though this was disclosed on the application form. After the interview, I was simply told that I wouldn't be offered a placement because I am deaf. This is from a company that advertises itself as being '*Positive about Disabled People*'.

Life After University

My career aspirations were to be an optoelectronics or electronics/electrical engineer, working for a company such as NPL, DERA, Nokia, Scottish Power, BNFL, British Energy, etc.

My university careers advisor and a second employment advisor have together provided me with excellent support since graduation, as I have found finding a job very hard. My 370 applications have resulted in only 5 interviews, with many companies not even bothering to reply to the application. My fellow graduates have all found jobs with an average of 16 applications. My experience is that slogans such as '*Equal Opportunities*' and '*Positive about Disabled People*' do not mean much in practice.

Eventually, with the support of my local MSP (writing letters to companies for me etc), I have just secured a one-year placement with Scottish Power in the role of Project Engineer (power networks, distribution & transmission). The MSP was very surprised at the difficulty I was having in securing a job and the apparent lack of practical implementation of companies' disability policies. I am looking forward to starting work and hope to have a long-term future with the company. During my employment, Scottish Power will provide me (as a deaf employee) with various means of support, including interpreters for meetings, textphone, Nokia mobile (sms - short message service, fax, email, access to internet etc), fire alarm and telephone vibrating pager etc.

7 The experience of a wheelchair user Agricultural Engineering student at Harper Adams University College

Chris Swift, Agricultural Engineering with Marketing & Management student , **Geoffrey Wakeham**, Engineering Course Manager (1989-2003), **Sarah Parsons**, Learning Support Tutor for Mathematics, Harper Adams University College.

Background

Chris Swift joined Harper Adams in 1994 as an able bodied BEng Agricultural Engineering student. During his first year he suffered a debilitating illness, called Guillain-Barré syndrome, which forced him to postpone his studies. The College maintained links with Chris and by September 1998 he had recovered sufficiently to return to Harper Adams as a first year BSc Agricultural Engineering with Marketing and Management student and wheelchair user with little or no use of his limbs. Chris graduated with a 1st Class Honours degree in June 2002. and has continued his studies in Engineering at Cranfield University; where he first completed an MSc and is currently studying for an engineering doctorate.

Chris' Reflections

When I became ill in March 1995 whilst studying at Harper Adams, I had little idea what the future would hold in terms of physical recovery and also how I would go about rebuilding my life. Although it may seem trivial, the promise of a place being kept open for me to return to provided a focus for my journey through rehabilitation. On arrival back at Harper Adams in September 1998 I was interested to see how the other guys on the course would view a wheelchair user. When I was 19 I'm sure I would have been uncertain or even wary of such an "unknown quantity". Fortunately, I made some great friends, many of whom I am still in contact with today.

It's largely thanks to friends and acquaintances that many of the obstacles encountered during my studies were overcome. For example, I originally used my personal assistant (PA) to act as note-taker during lectures. Although this was moderately successful, a much better solution came from simply copying the notes of a friend on the course who had a much better understanding of the subject matter and knew what was important to include.

Solving problems of physical accessibility of buildings proved to be an iterative process. Despite preparation of my living accommodation with automatic doors and equipment such as an electric bed and hoist, it was impossible to plan all aspects of access to all campus facilities. The key to Harper's success with regard to accessibility was in being flexible enough to deal swiftly with any problems that I discovered, as they arose.

Harper also organised placement periods in such a way that I could continue to live on the university campus. This was incredibly important in that it would have been nearly impossible to find rented, adapted, accessible accommodation for a six month placement period elsewhere in the country. Such a move would also have an impact on everything from which agency would supply my PAs to which health authority would be responsible for servicing my wheelchair!

After graduating I completed an MSc through Cranfield University in Bedfordshire, but again an agreement was made so that I could stay in the known environment of Harper Adams, allowing me to focus on work. I'm currently living in Bedfordshire studying for an engineering doctorate, looking into ways to increase ride comfort for wheelchair users. As a personal project I have just started Molten Rock Equipment Ltd as a manufacturer and distributor of a new sports off-road mobility device for the disabled.

Harper Adams University College Perspective

It has been, and remains, unusual to have applications from physically disabled students. Whilst the college is on a single, relatively level, site it is divided into four by two intersecting public roads. In 1998, When Chris returned to college, the buildings were generally pre-1960 and not adapted for wheel chair access. The nature of the courses (historically it was an agricultural college), the physical environment, the placement employment and the social life based around field sports discouraged applicants.

Prior to his return Chris visited the college and discussed both the best option academically and also his physical requirements. We proposed that he restarted his studies on an Agricultural Engineering with Marketing and Management course which could provide him with the skills and knowledge better suited to his physical limitations. Chris provided us with a wish list of facilities and access adjustments and when he returned he was provided with an adapted room with special showering facilities and powered doors. His PA had a room next door. Some improvements to access and ease of manoeuvring were carried out on his major routes and automatic doors and ramps were subsequently installed in the engineering department.

Although Chris arrived with voice activated computer equipment several adjustments had to be made to facilitate participation in classes and examinations. Initially his PA acted as note-taker but was soon replaced by a fellow student, funded by Kent LEA. Chris dictated examinations answers to an engineering technician who was familiar with the terminology if not the level of understanding required. Chris participated in practicals mainly by giving instructions to others for the physical tasks.

The compulsory employment placement created a further obstacle as none of the companies we approached felt they could provide a worthwhile experience. To solve this problem Chris was employed by the college. During his first six months in the computer department Chris developed the web-site www.offroadmachine.com which is still in use. His second six months was spent in our engineering workshops, where he supervised the design and adaptation of a small off road vehicle for use by disabled drivers, funded by the vehicle manufacturer. He was awarded 'A' grades for both placements.

Lessons Learned

Following the adjustments made to the physical facilities the college is now in a position to take further disabled students. There are currently several students with limited mobility studying at the college. Harper Adams is part-way through a project to implement SENDA requirements, called HASDAS (Harper Adams Support for Disabled Applicants and Students) which will result in an integrated service provision for applicants and students with a range of disabilities and specific learning

difficulties. Various policies have been developed. One outcome is that the college prospectus contains mention of the provision for disabled students. Funding was also obtained in recent years to improve access across the site (e.g. to install automatic doors and lifts) and this process is ongoing.

Generally the teaching and administrative staff worked very well together to accommodate Chris' needs. The engineering and administrative staff who knew him were receptive to his return, however there were initially wider concerns about how his studies and safety could be managed. The process of implementing support, e.g. from local education authority funding requires time and effort and can only be done according to each individual's situation.

The overall experience was vastly beneficial, now the college is much better prepared to consider and anticipate requirements of special needs students.

8 **Case study evaluating accessibility and use of a laboratory by a student who uses a wheelchair and a blind member of staff**

Abstract

This case study describes the findings of two disabled people who visited an engineering laboratory. It highlights aspects of building design, room layout and equipment use that are often overlooked and which often can be rectified quite simply and inexpensively. The points raised may be used to audit any building and lab.

Background

The Department of Electronics and Electrical Engineering is based in a purpose-built 1970's building on 8 levels. In order to evaluate the extent to which the building's design meets accessibility requirements and to determine what modifications would be required to make laboratory areas, in particular, truly accessible, some visits by disabled people were arranged.

Methodology

Karen who uses a motorised wheelchair and John who is blind and uses a long cane volunteered for the trial. Their comments on all aspects of the access to and use of the laboratory that could be improved were noted.

Issues for access

Karen could not use the automatic sliding main door as it is accessed by a flight of stairs. Instead she entered the building on level 4 where access is provided for wheelchair users through a **narrow passageway** to a single **outwards-opening door** from the building's integral car park. Getting out of the taxi was slightly problematic as there was no **kerb** to reduce the total height to descend.

The passageway from the car park to door is a **designated smoking area** with **cigarette bins**. This door is also the out-of-hours door, when it is operated by a **card and pin pad**. Within the building there is **flat access** and **lift access** to all floors, with heavy **double fire doors** throughout, and a total width of 120 cm to all corridors and doorways.

Karen had to wait at reception before going down one level to the lab. However the waiting area's close **arrangement of furniture** did not allow access to the seating area for Karen's wheel chair. Furthermore the seating and display units created an impenetrable barrier, preventing wheelchair access to the nominally wheelchair accessible **lavatory** in the corner. She noted that a parent with a child in a buggy and a visually impaired visitor would also have problems.

One of the lab's double doors was **latched** and Karen couldn't open it. The **space between the benches** enabled Karen to manoeuvre fairly easily. However, the bench **height** was designed to be used by someone sitting on a traditional high lab stool and prolonged use from a wheelchair would have been uncomfortable. Typically, students work in pairs at each **workstation**, with insufficient room if the

neighbouring workstation also has 2 students. Some equipment is normally used whilst on a **high level shelf** built above the workbench.

John has some familiarity with the building and was able to locate and use the main entrance unaided. However guidance was necessary to find and use the lift and then to find the laboratory room as **Braille or other tactile cues** for navigation are not available in the building.

Audit for access

- Is a designated smoking area a pleasant entry to the building?
- Do cigarette bins cause an obstacle to wheelchairs?
- Is there reserved parking for disabled people?
- Is the lighting in the passageway sufficient for all disabled people, including blind persons with some light vision?
- Do entrance doors open inwards or automatically?
- Are PIN pads at an accessible height with a paddle system required for wheelchair users outside of normal hours?
- Are fire doors fitted with automated hold-open electro-magnet mechanisms or light enough to open and wide enough that only one needs to be opened to get a wheel chair through?
- Once open do the doors swing shut with the risk of trapping hands?
- Are there hoists in the lavatories?
- Are all buttons on lifts accessible?
- Can some benches be adjustable to accommodate various heights of chairs and wheelchairs?
- Are workstations far enough apart?
- Can equipment be easily moved down onto the workbench level for ease of access?
- Are there Braille or tactile clues on lift buttons, doors and corridors to assist in direction throughout the building?
- Do you operate a brief run-through before lab sessions for familiarisation with the layout of the lab, including the location of equipment?
- Do your demonstrators have training in supporting disabled students?

Issues for laboratory work

Karen's lab requires work on the computer, using the SPICE software to compare a simulation with a real circuit followed by work with the real circuit and specialist measuring equipment. Karen has reasonable use of her hands and therefore did not experience any particular problems manipulating the various **small knobs and switches** on the equipment. However she does not type and uses a **dictation package** to interact with computers. The use of software raises issues of the **compatibility** of different versions and operating systems.

John's laboratory required him to make **observations** from an oscilloscope, adjust controls, **take measurements** and **record results**. Thereafter he was required to **connect** "black boxes" to an oscilloscope, signal generator and gain phase meter with cables prepared with black or red connectors. Each box has a schematic **circuit diagram** printed on the top.

John felt that coaxial connectors and other leads can be connected without problems once items of equipment are known and understood. However there were at least three **different designs** of oscilloscope in the laboratory. Although all of them have controls performing similar functions, the locations and graduations of a given control vary and would be **time** consuming to learn by heart.

Audit for laboratory work

- Can switches and knobs be used by people who have dexterity problems?
- Are there any technological aids used to support these tasks?
- Are dictation packages connected to the computers?
- Is there compatibility between supporting software and your department's operating system?
- Is there a virtual laboratory available for the course?
- Are there Braille notetakers and computers with screenreaders and Braille displays in the lab?
- Is an appropriate extension of time given to accommodate students who have reading disabilities or require breaks in a three hour lab session?
- Are lab sheets made available in advance?
- Do you use dyno Braille tape to mark cables and equipment?
- Are symbols and circuit diagrams printed on equipment discernable to touch?
- Does equipment have audio output or RS232 computer connection to enable output of data to a computer for subsequent use with screen readers?
- Can LabView and other specialised software be read with screen readers?

How Can Other Academics Reproduce This?

This case study illustrates how so much of what is taken for granted by non-disabled people can create problems for disabled people. Most of the access issues are easily rectified at minimal cost. The issues for laboratories can be more complicated, requiring equipment and technology, although some changes, such as Braille dynotaping to label equipment, would be relatively low cost and easy to implement. However, recognition of the need at time of purchase or replacement will ensure a much more accessible environment.

Acknowledgements: We are grateful for technical advice from technician Tom O'Hara and Lecturer Gil Harrison, expert advice on disability issues in the lab from our disabled consultants John and Karen Ball; and financial support from LTSN Engineering.

13 Scenario Comments

Scenario 1 – Progressive Impairment

- The fact that the student might not live to complete the course is not a reason for not offering them a place.
- This would be unlawful.
- What you should do is to plan ahead so that you can respond when there is a deterioration.

Scenario 2 – No Room for Disabled Postgrads

- Such a comment is discriminatory and unlawful.
- This is the case even though the postgrad has not suffered any clear damage, such as being refused a place.
- Our suggestion would be that you refer the student to your institution's Disability Support Service. They will be able to advise the student on the law and on their options, and if necessary they may well talk to the supervisor.
- The student's options clearly include civil proceedings or contacting the Disability Rights Commission.

Scenario 3 – Your Institution's Services

This is partly a case of finding out what's available – and where – in your institution. There is likely to be a Disability Support Service and perhaps a dyslexia unit or an English language support unit.

Remember, though, that you can get help with your teaching from:

- **Colleagues** – there will certainly have been dyslexic students in the department before
- **The student** – he or she will probably have some good ideas on what would help them, though they will not be familiar with the requirements of higher education
- **Staff or educational development** – Your local unit will be able to offer advice or put you in touch with someone else who can.

Scenario 4 – A Deaf Student on a Short Fat Module

- If colleagues have already taught this student, then it's worth talking to them.
- Email exchanges with the student should generate some very useful advice. You should discuss how to brief the rest of the group.
- It's probably worth talking to the interpreter (or interpreters, there may be several). They will be greatly helped by being aware of new or unusual terms, and they will be able to advise you on good practice in relation to position, questions, etc.
- People can learn to finger spell in half an hour (though it's no substitute for BSL, which takes a long time to learn). There's a BSL finger spelling machine at...
<http://www.british-sign.co.uk/spelling.html>
- It will usually be helpful to make your materials available beforehand. The student will be able to see your slides, but you'll be talking alongside them and the student will be looking at the interpreter.
- An issue that you might not think about is exhaustion. It is very hard work following a BSL interpreter and short fat modules can be very intensive. Short breaks from time to time could be a big help.

Scenario 5 – Departmental Web Pages

- Any new pages should certainly be designed with access by people with disabilities in mind.
- Remember...
 - The student may not be able to see or hear.
 - They may not be able to process some types of information easily and they may have difficulty reading or comprehending text.
 - They may have difficulty with certain colour schemes.
 - They may not have or be able to use a keyboard or mouse.
 - They may have a text-only screen, a small screen, a monochrome screen or a slow Internet connection.
 - They may have an early version of a web browser, a different web browser entirely, a voice browser, or a different operating system.
 - They may not have access to the latest plug-ins etc.
- Some aspects of this get quite technical – the JISC is working on guidance at the moment – and there may be institutional templates that you could use, so it's probably best to consult your institutional or faculty web people.
- You can use the Bobby site...
<http://www.cast.org/bobby/>
...to check your pages – or other people's. But this is not always easy to interpret.

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